REPORT NUMBER: 214D-MGA-2002-006

SAFETY COMPLIANCE TESTING FOR FMVSS 214
SIDE IMPACT PROTECTION
INDICANT

Audi AG
2002 Audi A4 4 Door
NHTSA NUMBER: C25800

PREPARED BY:
MGA RESEARCH CORPORATION
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BURLINGTON, WI 53105

February 8, 2002

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6111 (NSA-30)
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-97-C-11033.

Prepared by:_____ Date: _____
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FINAL REPORT ACCEPTED BY:

_____
COTR, Side Impact

_____
Date of Acceptance

Technical Report Documentation Page

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15. Supplementary Notes			

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier INDICANT Compliance Test was conducted on the 2002 Audi A4 4 Door in accordance with the specifications of the Office of Vehicle Safety Compliance Laboratory Test Procedure No. TP-214D-06 Side Impact Protection (except the test was conducted 8 km/h (5 mph) faster than the standard specifies) for determination of FMVSS No. 214 Side Impact Protection. The test was conducted at MGA Research Corporation, in Burlington Wisconsin on February 7, 2002.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.5 km/h, and the ambient temperature at the struck side (driver's) of the vehicle was 22.8° C. The target vehicle's maximum post test static crush was 270 mm at level 2. The test vehicle's occupant performance is as follows:

	DRIVER	PASS.
Left Upper Rib (LUR) Accel., g	40	75
Left Lower Rib (LLR) Accel., g	31	70
Lower Spine (T_{12}) Accel., g	39	60
Thoracic Trauma Index (TTI)	39	67
Pelvis (PEV) Accel., g	40	61
HIC	267	253

The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words Compliance Testing FMVSS 214D Side Impact Protection Side Impact Dummy (SID) New Car Assessment Program (NCAP)		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Adm. Technical Ref. Division, Room 5108 (NAD-52) 400 Seventh Street, S.W. Washington, D.C. 20590	
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SECTION 1

PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This side impact test is conducted as part of the FY' 2002 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-97-C-11033. The purpose of this test was to evaluate side impact protection in a 2002 Audi A4 4 Door manufactured by Audi AG.

1.2 TEST PROCEDURE

The side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC), Laboratory Test Procedure TP-214D-06, dated July 26, 2001 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA2 with the exception of the test speed, which was at the NCAP High Speed Lateral Impact level (61.2 km/h, approximately 8 km/h faster than compliance speed). The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2

SUMMARY OF SIDE IMPACT TEST

2.1 SUMMARY OF SIDE IMPACT TEST

A model year 2002 Audi A4 4 Door was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.5 km/h. The specified impact velocity range is from 61.1 to 62.7 km/h. The test (target) vehicle was stationary and positioned 63° to the line of forward motion. The weight of the vehicle as tested was 1882.9 kg and the test weight of the MDB was 1362.0 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on February 8, 2002.

One (1) real-time motion picture camera and nine (9) high-speed motion picture cameras were used to document the impact event. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and Side Impact Dummies (SIDs) can be found in Appendix A. Two 50th percentile adult male SID's were placed in the driver and left rear passenger designated seating positions according to instructions specified in the OVSC Laboratory Test Procedure dated July 26, 2001. Each SID was instrumented with fourteen (14) accelerometers in the following locations:

- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)
- Head Center of Gravity (CG) tri-axial accelerometers (X,Y and Z axes primary and redundant).

The test vehicle was instrumented with nineteen (19) structural accelerometers and the MDB was instrumented with five (5) accelerometers and two (2) contact switches on the bumper to compare left side to right side bumper impact timing. All data channels were recorded with a fully self contained on-board EME Data Acquisition System. The data was digitally sampled at 10,000 samples per second and processed per Appendix V of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 270 mm at level 2, 750 mm rearward of the left vertical impact point. The driver and passenger SID's, Serial Nos. 48 and 49 respectively, were calibrated just prior to this test. The SID's injury criteria is summarized as follows:

Measurements	Units	Driver	Passenger
Thoracic Trauma Index (TTI)	G's	39	67
Peak Pelvic G's (PEV)	G's	40	61
Head Injury Criteria (HIC)	none	267	253

Test summaries and post-test observations are presented in Section 3. The vehicle, camera, and occupant measurements are presented in Section 4. Appendix A contains the still photograph prints. Appendix B contains the driver and passenger SID's, vehicle, and MDB response data traces. Appendix C contains the SID's configuration and performance verification data. Appendix D contains the test equipment information.

TEST NOTES

The following accelerometers were not used for this test:

Left Front Door on Centerline
Midrear of Left Front Door
Left Front Door Upper Centerline
Midrear of Left Rear door
Left Rear Door Upper Centerline
Rear Seat Track
Left Mid B-Pillar

SECTION 3

SIDE IMPACT DUMMY (SID) AND VEHICLE TEST DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	English Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

*Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2002/Audi/A4/4 Door
Test Program: 214 Indicant Side Impact
NHTSA No. C25800
Test Date: 2/8/02

TEST VEHICLE INFORMATION

Make	Audi
Model	A4
Body Style	4 Door
NHTSA No.	C25800
VIN	WAULC68EX2A171341
Color	Green
Delivery Date	January 28, 2002
Odometer Reading (mile)	11
Dealer	International Autos
Transmission	Manual
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	1.8
Engine Placement	Lateral

TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	Curtain & Side Seat
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
AM/FM/Cassette	Yes
Anti-theft System	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG
Date of Manufacture	11/2001

GVWR (kg)	2085
GAWR Front (kg)	1050
GAWR Rear (kg)	1050

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	280	280
Cold Pressure (kPa)	210	210
Recommended Tire Size	P205/65R15	P205/65R15
Tire Size on Vehicle	P205/65R15	P205/65R15
Tire Manufacturer	Pirelli	Pirelli

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Contour	N/A	
Number Of Occupants x 68.04 kg.	2	3	0	340.2
Capacity Wt. (VCW) (kg)				519.4
Cargo Wt. (RCLW) (kg)				179.2

DATA SHEET NO. 1... (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	445.9	328.9		499.9	469.2	
Right	kg	445.4	331.1		463.1	450.7	
Ratio	%	57.5	42.5		51.1	48.9	
Totals	kg	891.3	660.0	1551.3	963.0	919.9	1882.5

Note: weight was adjusted at test time 40 kg was added in spare tire well. Per COTR.

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1551.3
Weight of 2 P572E ATDs	kg	161.5
Rated Cargo/Luggage Weight (RCLW)	kg	179.2
Calculated Vehicle Target Weight (TVTW)	kg	1892.0

- Actual As Tested Weight (ATW) will be TVTW -5/-10 kg

TEST VEHICLE ATTITUDES AND CG

	Units	LF	RF	LR	RR	CG(aft of front axle)
As Delivered	mm	690	689	690	689	1127
As Tested	mm	679	680	647	654	1294
Fully Loaded	mm	674	683	647	658	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2648
Total Vehicle Length at Left Side	mm	3763
Total Vehicle Length at Centerline	mm	4575
Total Vehicle Length at Right Side	mm	3763
Total Vehicle Width	mm	1770
Weight of Ballast in Cargo Area	kg	123.8
Amount of Stoddard Solvent in Fuel Tank	liters	61.5

TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2648
Target Impact Point Aft of Front Axle	mm	384
Actual Impact Point Aft of Front Axle	mm	397

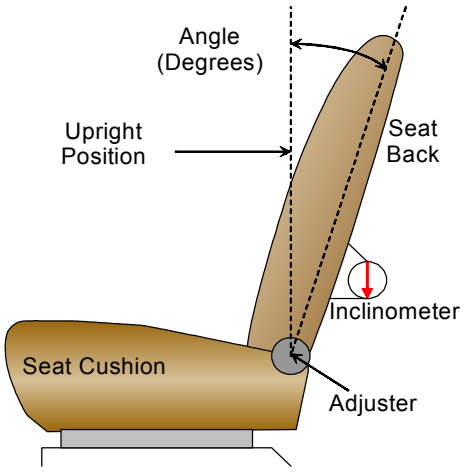
DATA SHEET NO. 1…(continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

NORMAL DESIGN RIDING POSITION

The driver seat is positioned to the manufacturer's designated angle. 16° (from vertical) use straight edge on midpoint of back of seat.



FRONT SEAT ASSEMBLY

Driver seat back angle: 16°
Passenger seat back angle: non-adjustable

SEAT FORE/AFT POSITIONS

The driver's seat is manually operated and the rear passenger seat has no adjustments. The fore/aft is set to the middle position for the driver's seat.

Driver seat fore/aft total travel: 255 mm
Passenger seat fore/aft total travel: N/A
Driver seat fore/aft position: 127 mm
Passenger seat fore/aft position: N/A

SEAT BELT UPPER ANCHORAGE

The test vehicle is equipped with adjustable "D" ring anchorage for the driver's seat position. There are 5 positions or detents, with the uppermost position numbered "1". The driver's "D" ring anchorage is placed in position 3 or middle position.

DATA SHEET NO. 1...(continued)

TEST VEHICLE INFORMATION

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

FUEL TANK CAPACITY DATA

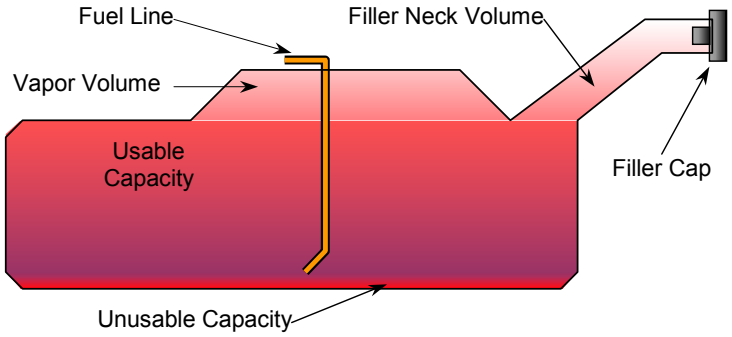
The "Usable Capacity" of the standard equipment fuel tank is: 66 liters

The "Usable Capacity" of any optional equipment fuel tank is: 70 liters

92-94% of "Usable Capacity" for certification to FMVSS 301 requirements: 60.7 to 62.0 liters

Actual amount of Stoddard solvent added to vehicle for certification test: 61.5 liters

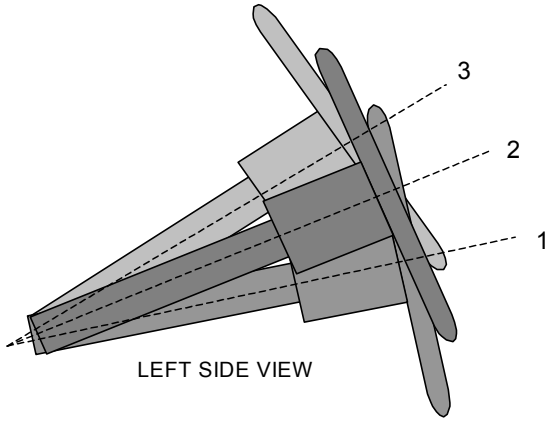
The test vehicle is equipped with an electric fuel pump. The fuel filler door is located on the right rear fender.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes, when it is moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, and inclinometer is placed onto the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

Lowermost, position 1: 18.4°

Geometric center, position 2: 20.6°

Uppermost, position 3: 22.8°

Telescoping steering wheel travel: 50 mm
Test position: 25 mm

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	445.9	328.9		499.9	469.2	
Right	kg	445.4	331.1		463.1	450.7	
Weight Ratio	%	57.5	42.5		52.3	48.9	
Totals	kg	891.3	660.0	1551.3	963.0	919.9	1882.5

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	210	336
Level 2	Occupant H-Point	mm	270	516
Level 3	Mid Door	mm	268	595
Level 4	Window Sill	mm	166	927
Level 5	Window Top	mm	73	1343
Level 2	Maximum Penetration	mm	270	516

INSTRUMENTATION

Driver SID Accelerometers	14
Passenger SID Accelerometers	14
Vehicle Structure Accelerometers	19
MDB Accelerometers	5
Total	52

DATA SHEET NO. 3

MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1252
Overall Length Including Honeycomb Face	4115
Wheel base of Framework Carriage	2590
C.G. Location aft of Front Axle	1127

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	395.1	293.8	
Right	kg	385.7	287.4	
Ratio	%	57.3	42.7	
Totals	kg	780.8	581.2	1362.0

SPEED AND IMPACT ANGLE DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.5
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.6
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	89.7

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush
Level	Description	Height	Distance	Direction	
1	Center of Bumper (mm)	432	800	Right	199
2	Top of Bumper (mm)	533	700	Right	123
3	Mid Level (mm)	686	800	Left	156
4	Top of Stack (mm)	813	800	Left	151

MDB INSTRUMENTATION AND CAMERAS

Accelerometers	5
Contact Switches	2
High Speed Cameras	2

DATA SHEET NO. 4

POST TEST OBSERVATIONS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat SID	Rear Seat SID
Dummy Type / Serial No.	Sid/048	Sid/049
Head Contact	Curtain airbag	Curtain airbag
Upper Torso Contact	Side airbag	Door panel
Lower Torso Contact	Side airbag	Arm rest
Left Knee Contact	Door panel	Door panel
Right Knee Contact	Left knee	Left knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Remained closed	Remained closed
Right Side Door Opening	Remained closed	Remained closed
Seat Movement	0	0
Seat Back Failure	No	No

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation
Sill Separation	None
Windshield Damage	Windshield cracked
Window Damage	Left rear side window broke
Other Notable Effects	None

AIRBAG DEPLOYMENT

	Driver	Front Passenger	Rear Passenger
Front	No	No	NA
Side	Yes	No	NA
Curtain	Yes	No	Yes

MDB LEFT EDGE IMPACT POINT DATA

Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 50	13 rearward
Vertical Offset	mm	+/-20	0 up/down

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

SID INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

THORAX AND PELVIS PEAK ACCELERATIONS (FIR 100 Filtered)

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Upper Rib (LUR)	Y	G's	40.0	41	3.2	20	74.9	43	23.3	91
Upper Rib (LUR)(R)	Y	G's	40.6	41	2.8	20	75.9	43	23.1	90
Lower Rib (LLR)	Y	G's	31.0	15	3.7	10	69.9	43	25.8	91
Lower Rib (LLR) (R)	Y	G's	30.4	38	3.8	10	71.2	43	25.5	91
Lower Spine (T_{12})	Y	G's	38.6	30	5.7	66	59.6	46	9.7	75
Lower Spine (T_{12}) (R)	Y	G's	37.8	30	5.7	66	58.9	45	9.8	75
Pelvis (PEV)	Y	G's	39.7	28	8.9	66	60.6	41	4.9	90
Pelvis (PEV) (R)	Y	G's	40.1	27	7.2	66	61.7	41	4.9	91

THORACIC TRAUMA INDEX (TTI) AND PELVIC ACCELERATION (FIR 100 Filtered)

Location	Driver				Passenger			
	LUR	T_{12}	TTI(g)	PEV(g)	LUR	T_{12}	TTI(g)	PEV(g
Rib, Spine, and Pelvis	40.0	38.6	39	39.7	74.9	59.6	67	60.6
Rib, Spine, and Pelvis (R)	40.6	37.8	39	40.1	75.9	58.9	67	61.7

HEAD CG PEAK ACCELERATIONS (SAE CLASS 1000 Filtered)

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	3.2	37	21.0	61	4.0	115	9.8	38
Head CG	Y	G's	52.0	51	3.6	111	36.1	40	10.6	73
Head CG	Z	G's	10.5	32	9.0	65	20.9	90	44.3	58
Head CG Resultant		G's	54.0	51			53.1	58		

HEAD INJURY CRITERIA (SAE CLASS 1000 Filtered)

Location	Driver				Passenger			
	HIC	T^1	T^2	Avg G's	HIC	T^1	T^2	Avg G's
Head CG	267	39.6	63.5	41.6	253	36.2	64.8	37.9

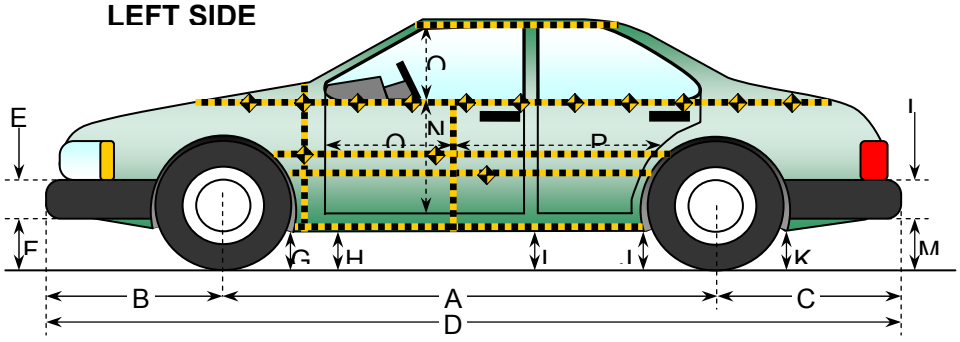
Positive Acceleration Polarities: Longitudinal (X) = Forward
(Conforms to SAE J211) Lateral (Y) = Right
Vertical (Z) = Down

DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

LEFT SIDE



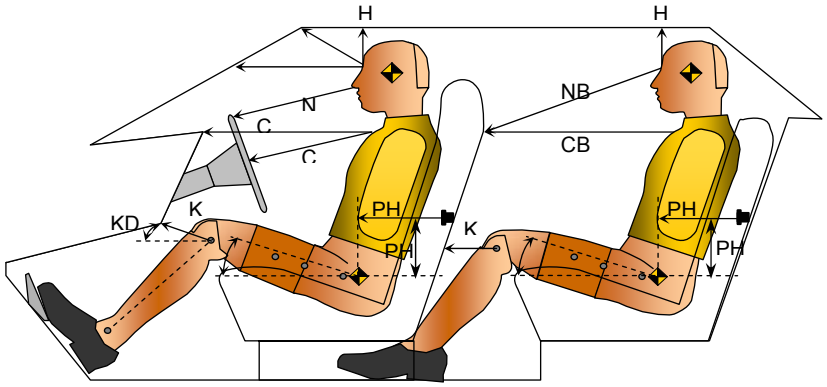
All Measurements in mm

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2648	2643	-5
B	Front Axle to FSOV	899	903	4
C	Rear Axle to RSOV	1028	1020	-8
D	Total Length at Centerline	4575	4566	-9
E	Front Bumper Thickness	167	167	0
F	Front Bumper Bottom to Ground	360	355	-5
G	Sill Height at Front Wheel Well	176	169	-7
H	Sill Height at Front Door Leading Edge	190	184	-6
I	Sill Height at "B" Pillar	175	161	-14
J1	Sill Height at Rear Wheel Well	159	150	-9
J2	Pinch Weld Height at Rear Wheel Well	177	170	-7
K	Sill Height Aft of Rear Wheel Well	169	173	4
L	Rear Bumper Thickness	119	119	0
M	Rear Bumper Bottom to Ground	447	532	85
N	Sill Height to Window Bottom Sill	643	615	-28
O	Front Door Leading Edge to Impact CL	774	717	-57
P	Rear Door Trailing Edge to Impact CL	1050	993	-57
Q	Front Window Opening	424	412	-12
R	Right Side Length	3763	3771	8
S	Left Side Length	3763	3721	-42
T	Vehicle Width at "B" Post	1770	1523	-247

DATA SHEET NO. 7

SID LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

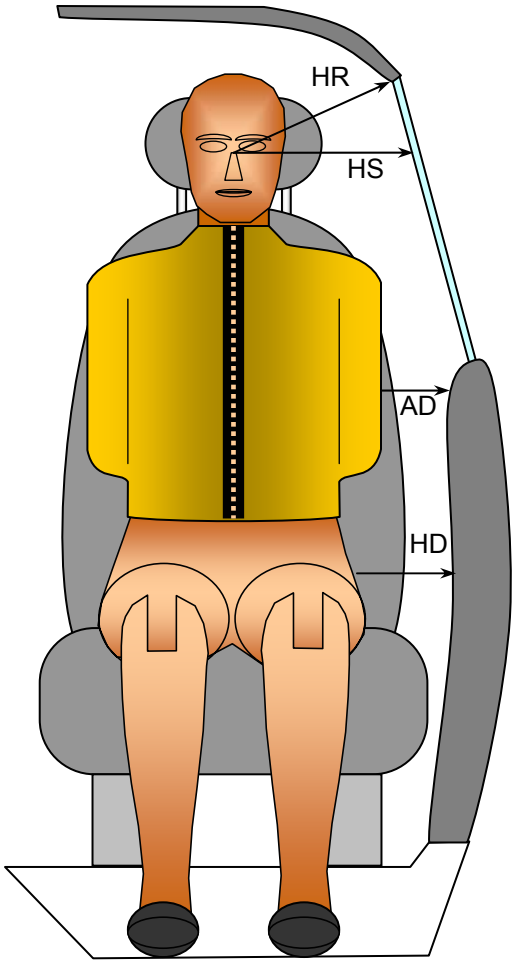


Driver Code	Pass. Code	Measurement Description	Driver 48		Passenger 49	
			Length(mm)	Angle(°)	Length(mm)	Angle(°)
HH		Head to Header	403			
HW		Head to Windshield	629			
HZ	HZ	Head to Roof	169		142	
NR	NB	Nose to Rim/Nose to Seatback	445		563	
CD	CB	Chest to Dash or Seatback	535		484	
CS		Chest to Steering Wheel	346			
KDL	KBL	Left Knee to Dash or Seatback	272	0.0	142	0.0
KDR	KBR	Right Knee to Dash or Seatback	282	0.0	151	0.0
PA	PA	Pelvic Angle		23.1		24.7
PHX	PHX	H-Point to Striker (X-Axis)	137		185	
PHZ	PHZ	H-Point to Striker (Z-Axis)	154		240	

DATA SHEET NO. 8

SID LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

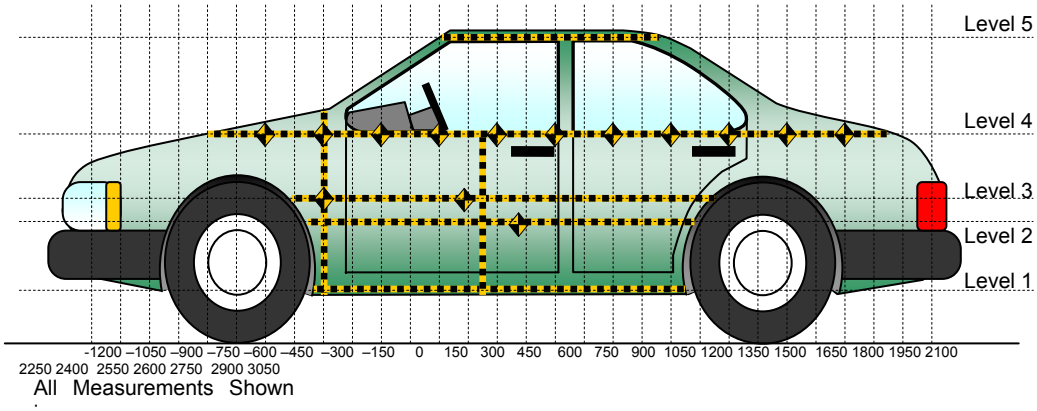


Code	Measurement Description	Units	Driver 48	Passenger 49
HR	Head to Side Header	mm	186	159
HS	Head to Side Window	mm	306	297
AD	Arm to Door	mm	97	69
HD	H-Point to Door	mm	145	144

DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02



LEFT SIDE

Measurements are taken with vehicle in the as tested condition.
Measurements along the vertical 800 mm.
All measurements below in mm.

Level	Measurement Description	Height Above Ground
5	Window	1343
4	Window Sill	927
3	Mid Door	595
2	Occupant H-Point	516
1	Sill Top	336

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1050															
-900		299	302	367			311	310	374					7	
-750		242	265	345			275	275	353					8	
-600				328					336					8	
-450				315					329					14	
-300				309					325					16	
-150				304					320					16	
0	231	225	226	299		265	261	258	316		34	36	32	17	
150	230	222	220	295		335	364	359	335		105	142	139	40	
300	225	217	215	290		392	432	406	350		167	215	191	60	
450	221	213	211	285		416	460	451	369		195	247	240	84	
600	219	210	208	283		424	469	460	390		205	259	252	107	
750	218	208	207	283	519	428	478	452	415	546	210	270	245	132	27
900	217	207	205	283	509	420	474	441	422	545	203	267	236	139	36
1050	217	207	205	285	509	417	463	440	440	556	200	256	235	155	47
1200	217	207	206	288	512	419	455	453	454	567	202	248	247	166	55
1350	218	209	208	292	515	409	470	457	456	581	191	261	249	164	66
1500	221	211	210	296	520	414	466	469	456	593	193	255	259	160	73
1650	225	215	213	300	525	410	476	481	440	579	185	261	268	140	54
1800	230	220	218	305	532	369	435	449	389	568	139	215	231	84	36
1950		209	222	315	540		330	321	344	564		121	99	29	24
2100			204	322				252	368				48	46	
2250				335					366					31	
2400			206	345				226	370				20	25	
2550		215	242	363			228	251	383				9	20	
2700		271	275	379			279	280	395			8	5	16	
2850		297	297	402			302	304	411			5	7	9	
3000															
3150															
3300															

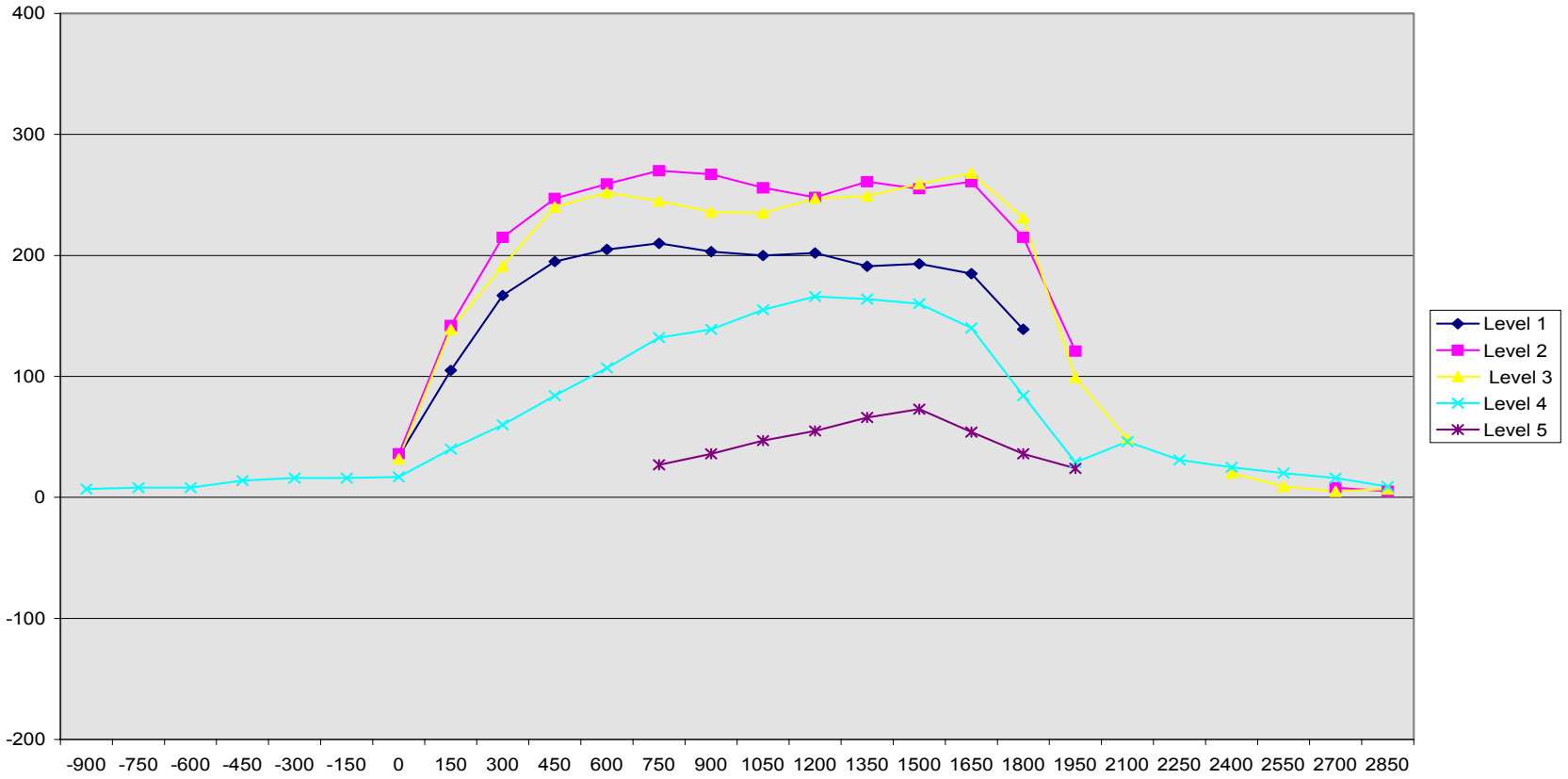
Reference plane is parallel to test vehicle longitudinal centerline.

Given dimensions = Reference plane to car body

DATA SHEET NO. 10...(continued)

VEHICLE EXTERIOR CRUSH PROFILES

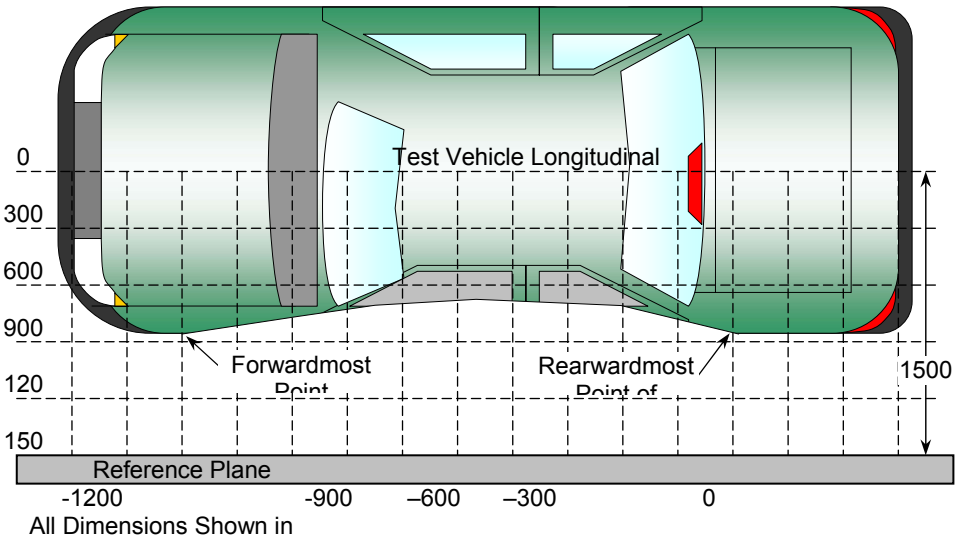
Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02



DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02



TOP

Damage Profile Distances

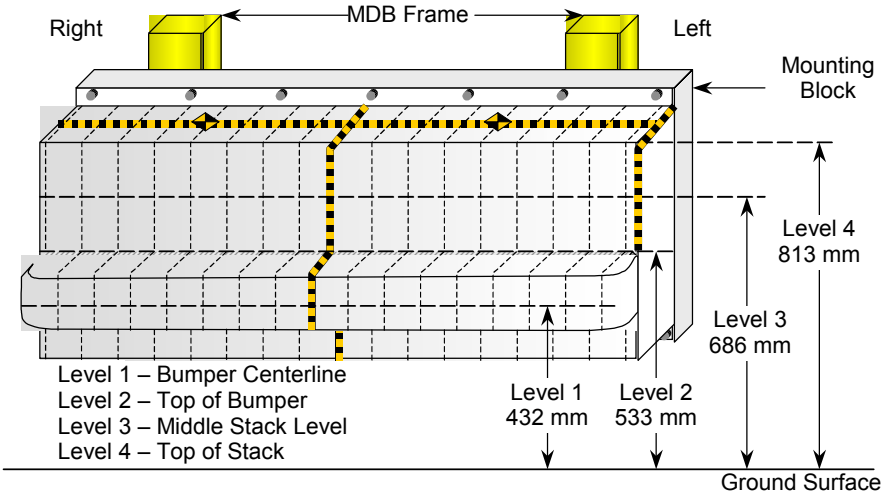
DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	2850 mm	4	402	411	9
2	2089 mm	3	204	260	56
3	1302 mm	2	207	472	265
4	560 mm	2	211	467	256
5	-159 mm	4	295	321	26
6	-900 mm	4	367	374	7

Reference plane is parallel to test vehicle longitudinal centerline.
Given dimensions = Reference plane to car body.

DATA SHEET NO. 12

DEFORMABLE BARRIER HONEYCOMB FACE STATIC CRUSH

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02



DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C_L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	199	184	166	160	160	165	163	151	144	140	139	139	136	140	148	167	194
2	120	123	120	113	98	86	72	69	66	67	72	82	86	94	98	107	115
3	70	38	36	27	25	28	38	66	50	28	22	21	24	32	58	97	156
4	90	49	20	17	19	31	63	79	53	35	38	42	52	68	88	107	151

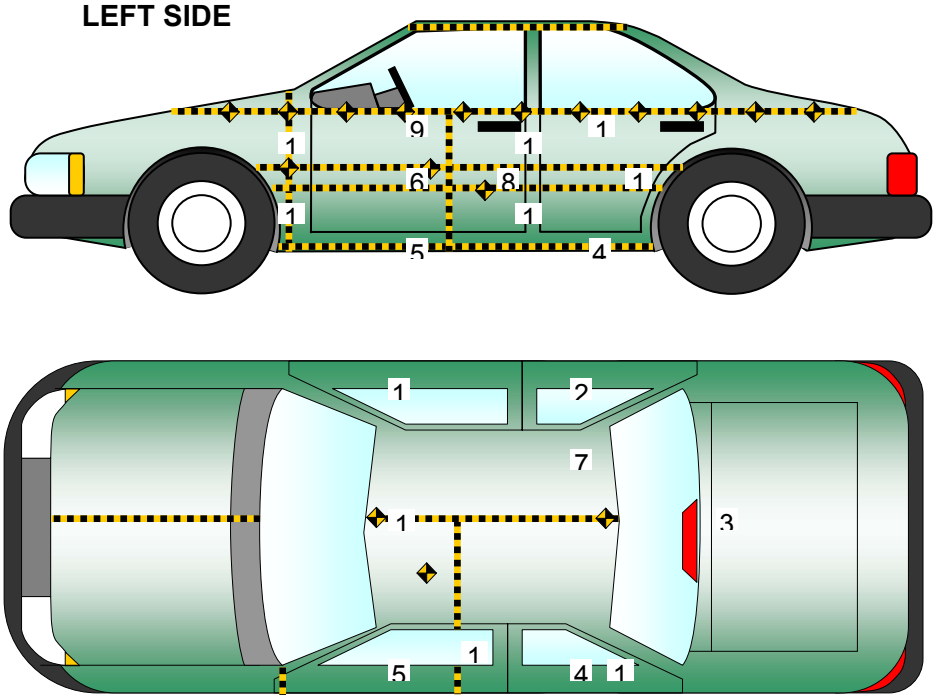
All Dimensions in mm

DATA SHEET NO. 13

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2002/Audi/A4/4 Door
Test Program: 214 Indicant Side Impact
NHTSA No. C25800
Test Date: 2/8/02

LEFT SIDE



No.	Location
1	Right Sill at Front Seat
2	Right Sill at Rear Seat
3	Rear Floorpan Above Axle
4	Left Sill at Rear Door
5	Left Sill at Front Door
6	Left Front Door Centerline
7	Right Rear Occupant Compartment
8	Left Front Door Mid-Rear
9	Left Front Door Upper Centerline

No.	Location
10	Left Rear Door Mid-Rear
11	Left Rear Door Upper Centerline
12	Left Lower B-Post
13	Left Middle B-Post
14	Left Lower A-Post
15	Left Middle A-Post
16	Front Seat Track
17	Rear Seat Track or Structure
18	Vehicle CG

DATA SHEET NO. 13...(continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)			Peak Values (G's)				
		X	Y	Z	Axis	Max	Time	Min	Time
1	Right Sill at Front Seat	2514	736	-223	X	4.0	64	6.5	11
					Y	23.4	24	4.3	63
					Z	6.1	38	6.3	11
					RES	23.7	24		
2	Right Sill at Rear Seat	1448	736	-238	X	3.4	64	3.4	11
					Y	24.5	27	3.5	63
					Z	5.6	42	4.9	20
					RES	24.7	27		
3	Rear Floorpan Above Axle	984	0	-539	X	4.5	20	7.8	6
					Y	24.8	27	3.4	100
					Z	11.3	38	3.7	15
					RES	25.8	27		
4	Left Sill at Rear Door	1484	-736	-237	Y	32.9	25	10.2	18
5	Left Sill at Front Door	2612	-736	-220	Y	73.6	15	8.8	11
7	Rear Occupant Compartment	1058	280	-365	Y	24.7	27	3.0	62
12	B-Post Lower	2016	-665	-294	Y	74.8	5	8.8	31
14	A-Post Lower	3067	-694	-344	Y	42.7	4	2.2	111
15	A-Post Middle	3170	-775	-815	Y	24.2	12	20.0	52
16	Front Seat Track	2192	-594	-314	Y	73.5	13	22.3	31
18	Vehicle CG	2391	0	-482	X	4.4	5	7.3	31
					Y	25.1	20	3.5	59
					Z	18.9	23	8.5	5
					RES	27.7	21		

Reference Points X - Test Vehicle Rear Bumper (+ forward)
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 14

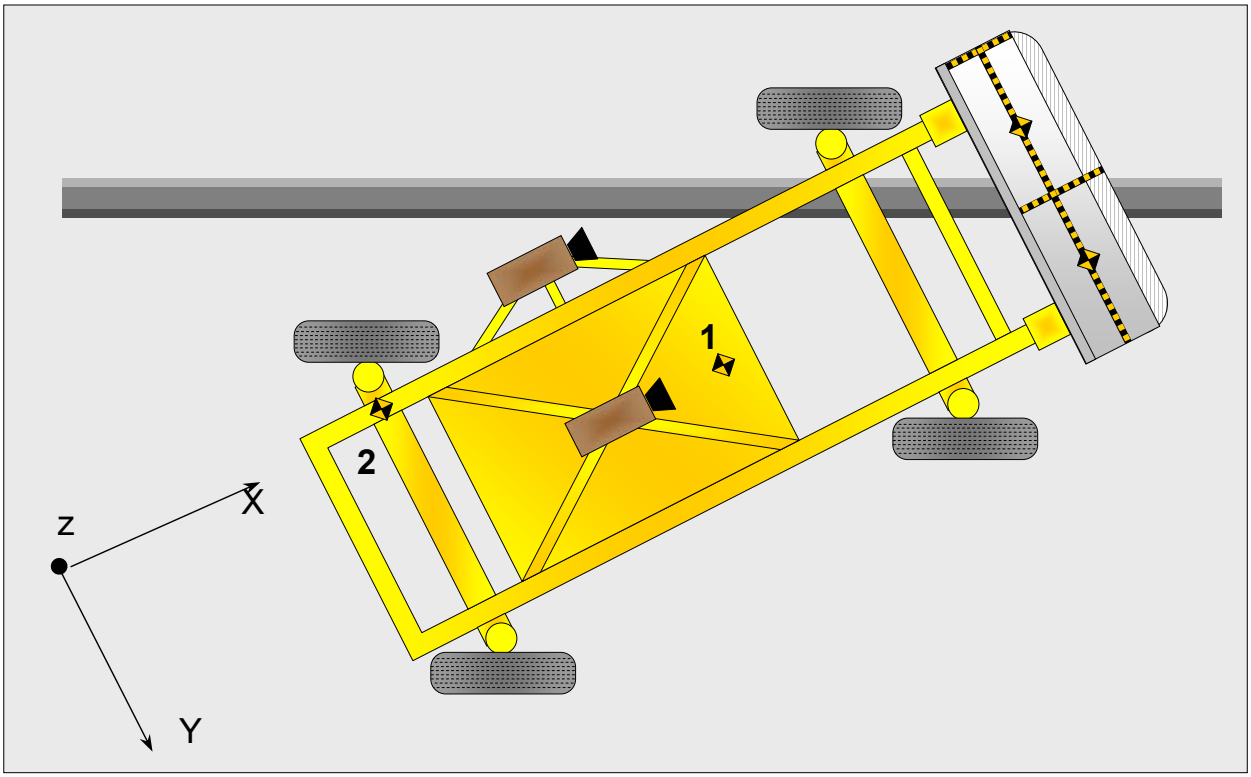
MDB ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

MDB ACCELEROMETER PEAK DATA AND LOCATIONS

Loc. No.	Accelerometer Location	Measurement (mm)			Peak Values (G's)				
		X	Y	Z	Axis	Max	Time	Min	Time
1	MDB CG	-1092	0	-483	X	1.8	101	19.8	42
					Y	2.2	66	5.4	52
					Z	21.9	57	21.6	22
					RES	28.5	22		
2	MDB Rear	-2591	-625	-622	X	2.3	102	22.9	32
					Y	4.4	31	1.5	64

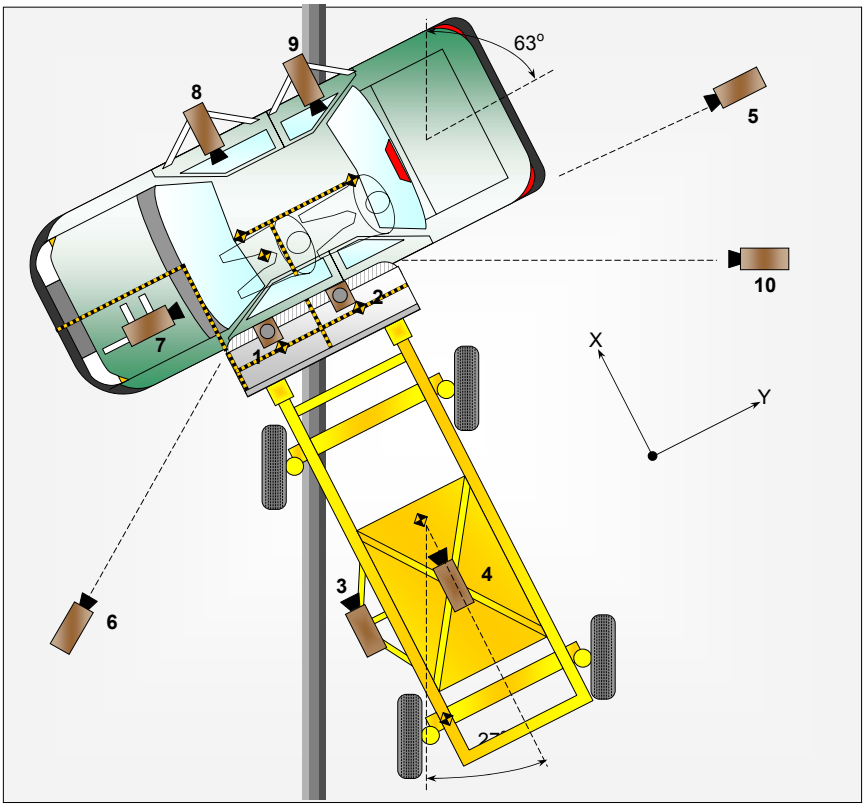
Reference Points X - MDB Front Axle (+ forward)
Y - MDB Centerline (+ to right)
Z - Ground Plane (+ down)



DATA SHEET NO. 15

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02



No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Overall	1008	60	-4990	8	**
2	Overhead Close-up	-819	668	-4950	25	**
3	MDB Onboard, Impact Point Close-up				13	**
4	MDB Onboard, Centerline of Impact				35	**
5	Right Side, Ground Level, Overall	3998	8954	-1743	25	909
6	Left Side, Ground Level, Overall	-1739	-1823	-1422	13	971
7	Vehicle Onboard Front SID, Front				13	**
8	Vehicle Onboard Front SID, Side				13	**
9	Vehicle Onboard Rear SID, Side				13	**
10	Real Time Coverage					

Reference Points X - Impact Line
Y - MDB Left Edge Impact Point
Z - Ground Plane

** = No timing marks

DATA SHEET NO. 16

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

Test Time: 1:12 pm Temperature at Time of Impact: 22.8 °C

Stoddard Solvent Spillage Measurements

A. From impact until vehicle motion ceases: 0 oz.
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 ounces)

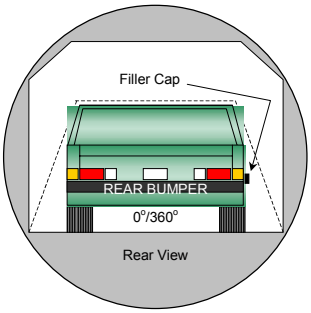
C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)

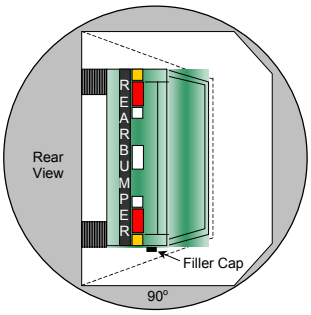
D. Spillage Details: None

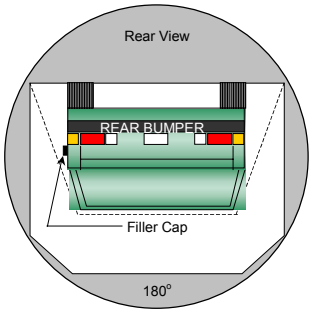
DATA SHEET NO. 17

FMVSS 301 STATIC ROLLOVER DATA SHEET

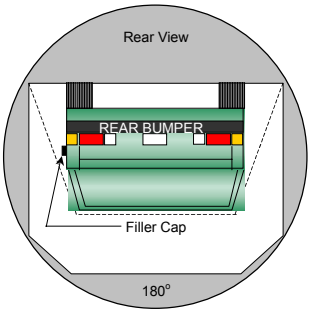
Test Vehicle: 2002/Audi/A4/4 Door NHTSA No. C25800
Test Program: 214 Indicant Side Impact Test Date: 2/8/02

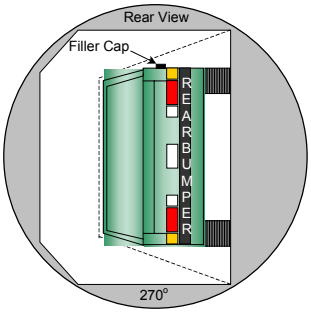


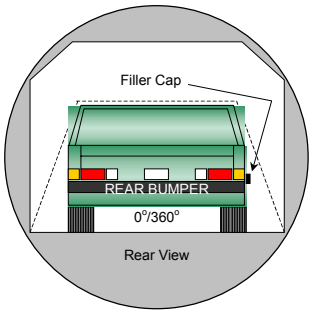




0^O to 90^O 90^O to 180^O







180^O to 270^O 270^O to 360^O

1. The specified fixture rollover rate for each 90^o of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent Spillage locations:

Rollover Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	168	300	0
90° to 180°	143	300	0
180° to 270°	146	300	0
270° to 360°	170	300	0

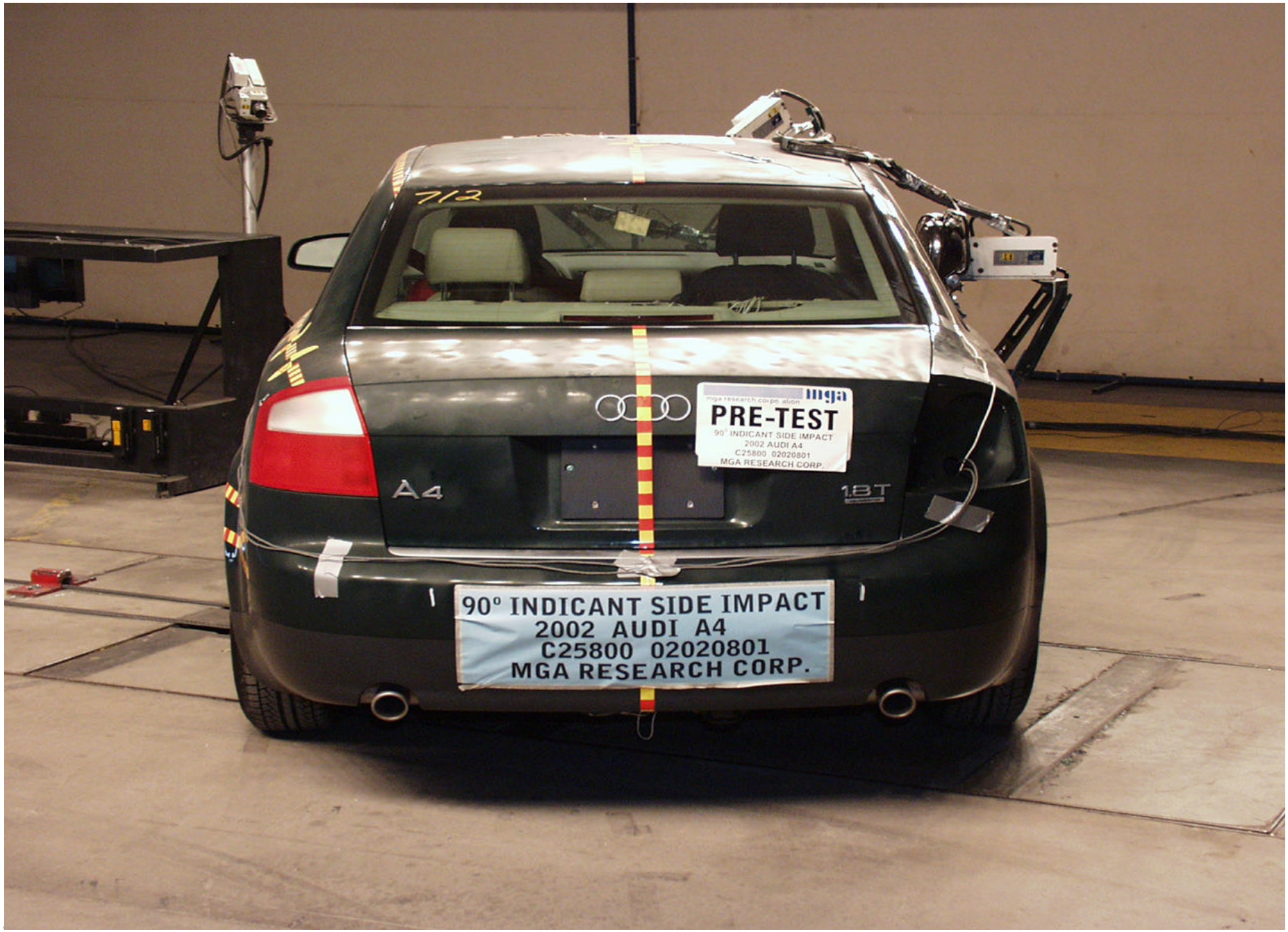
APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Pre-Test Front View of Test Vehicle

Post-Test Front View of Test Vehicle



Pre-Test Rear View of Test Vehicle

Post-Test Rear View of Test Vehicle

Pre-Test Left Side View of Test Vehicle

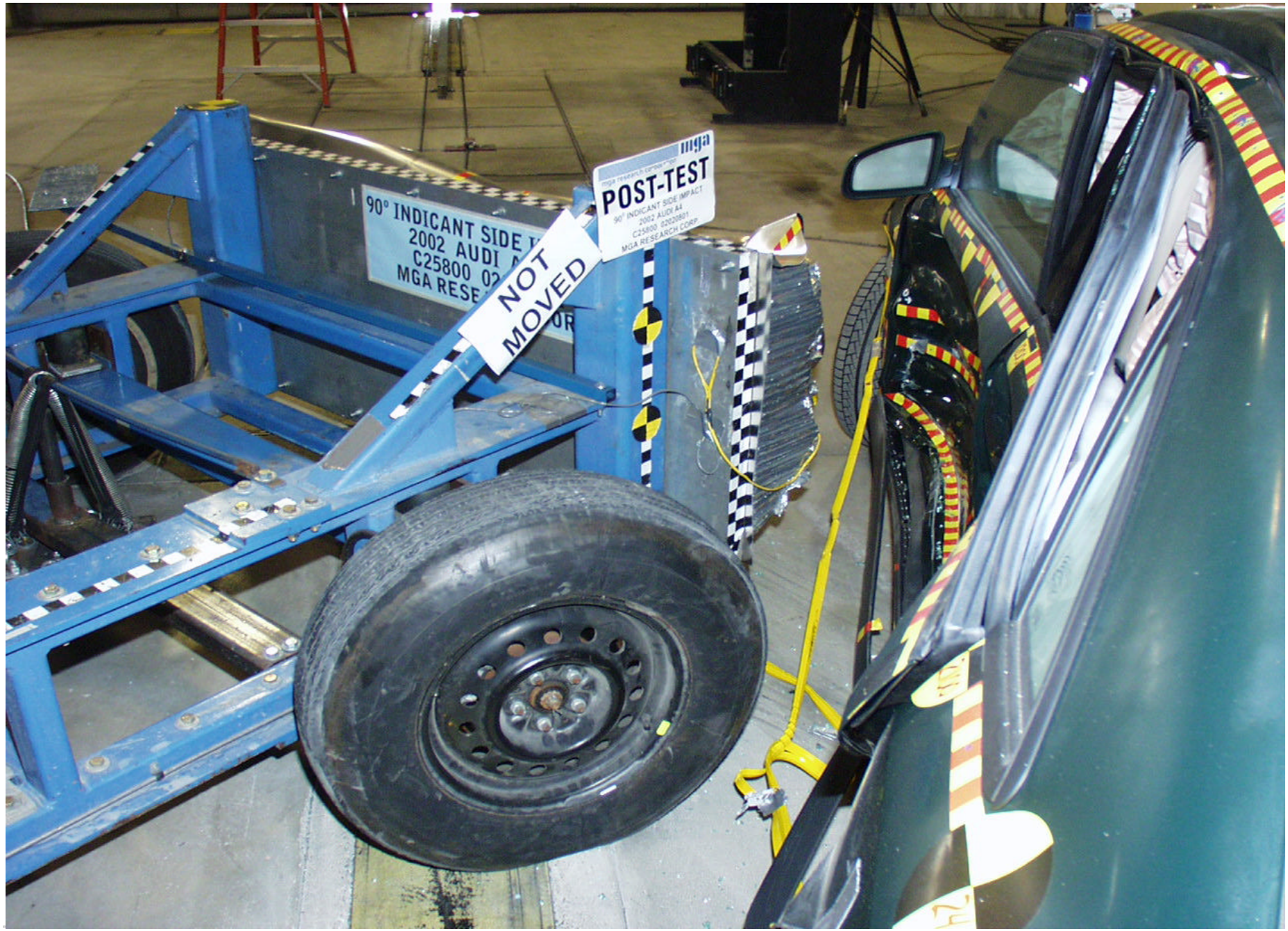
Post-Test Left Side View of Test Vehicle

Pre-Test MDB Positioned Against Vehicle (left side)

Pre-Test MDB Positioned Against Vehicle (right side)

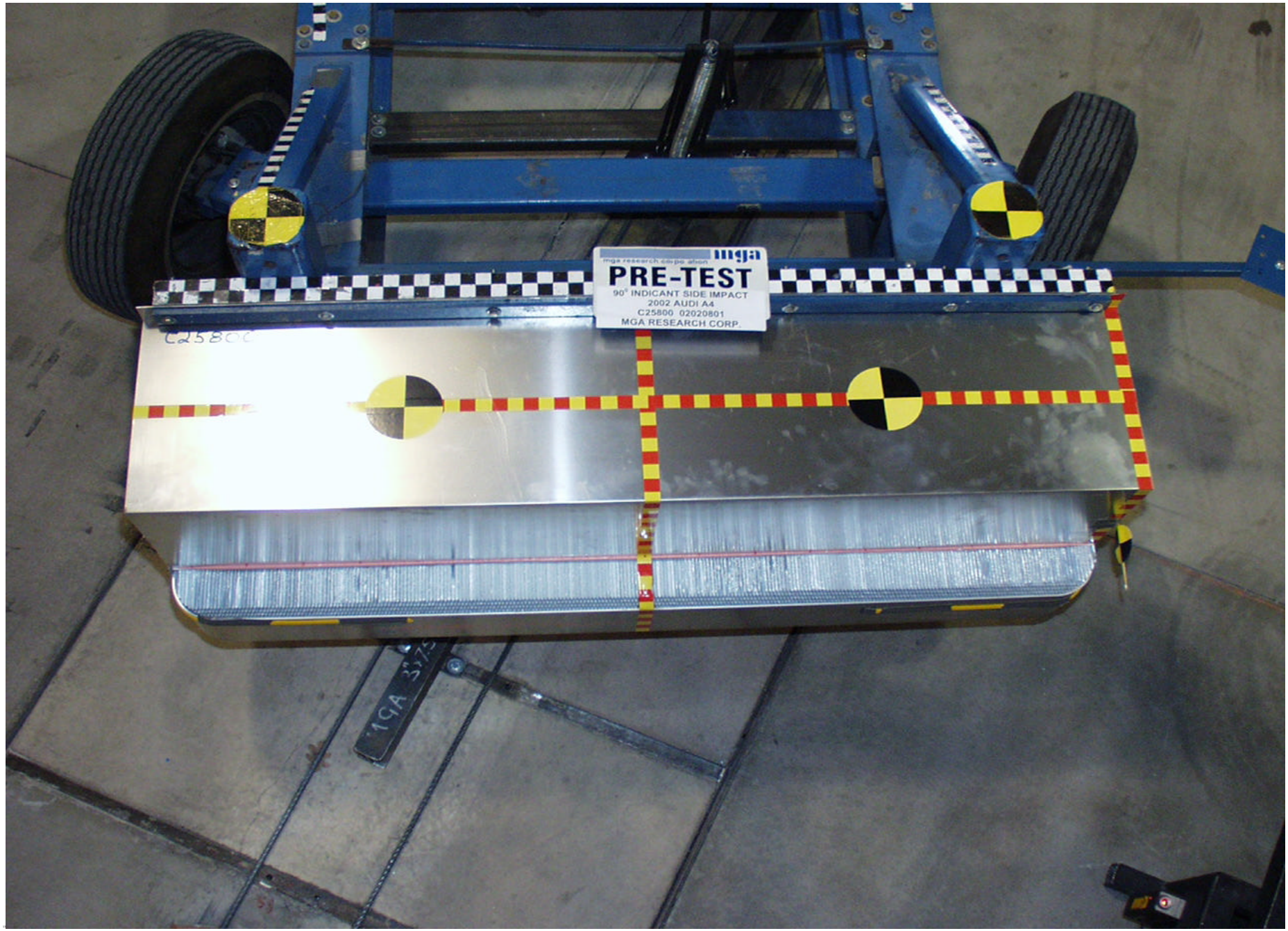
Pre-Test MDB Positioned Against Vehicle Overhead View

Post-Test MDB and Vehicle (left side)



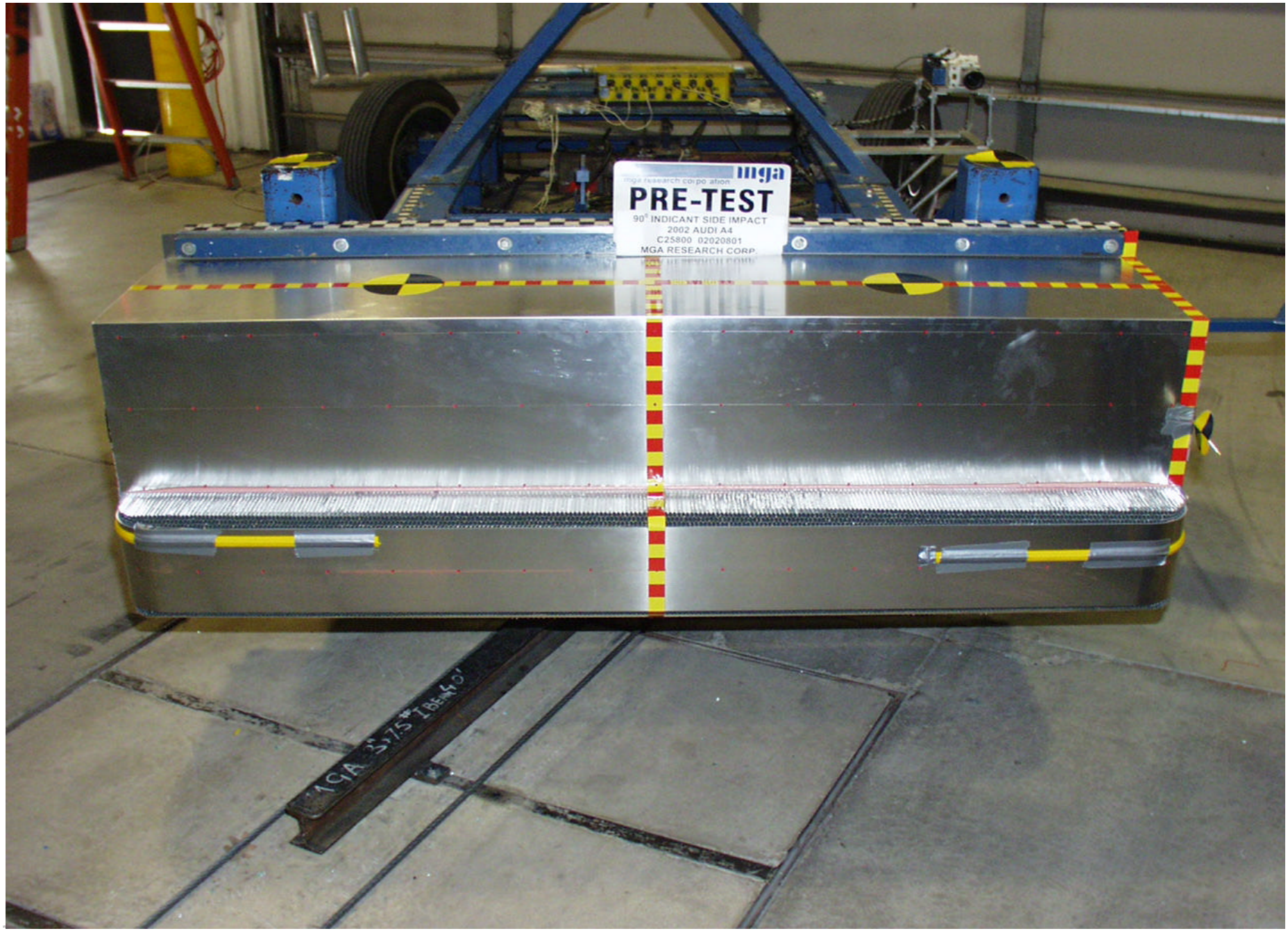
Post-Test MDB and Vehicle (right side)

Post-Test MDB and Vehicle Overhead View

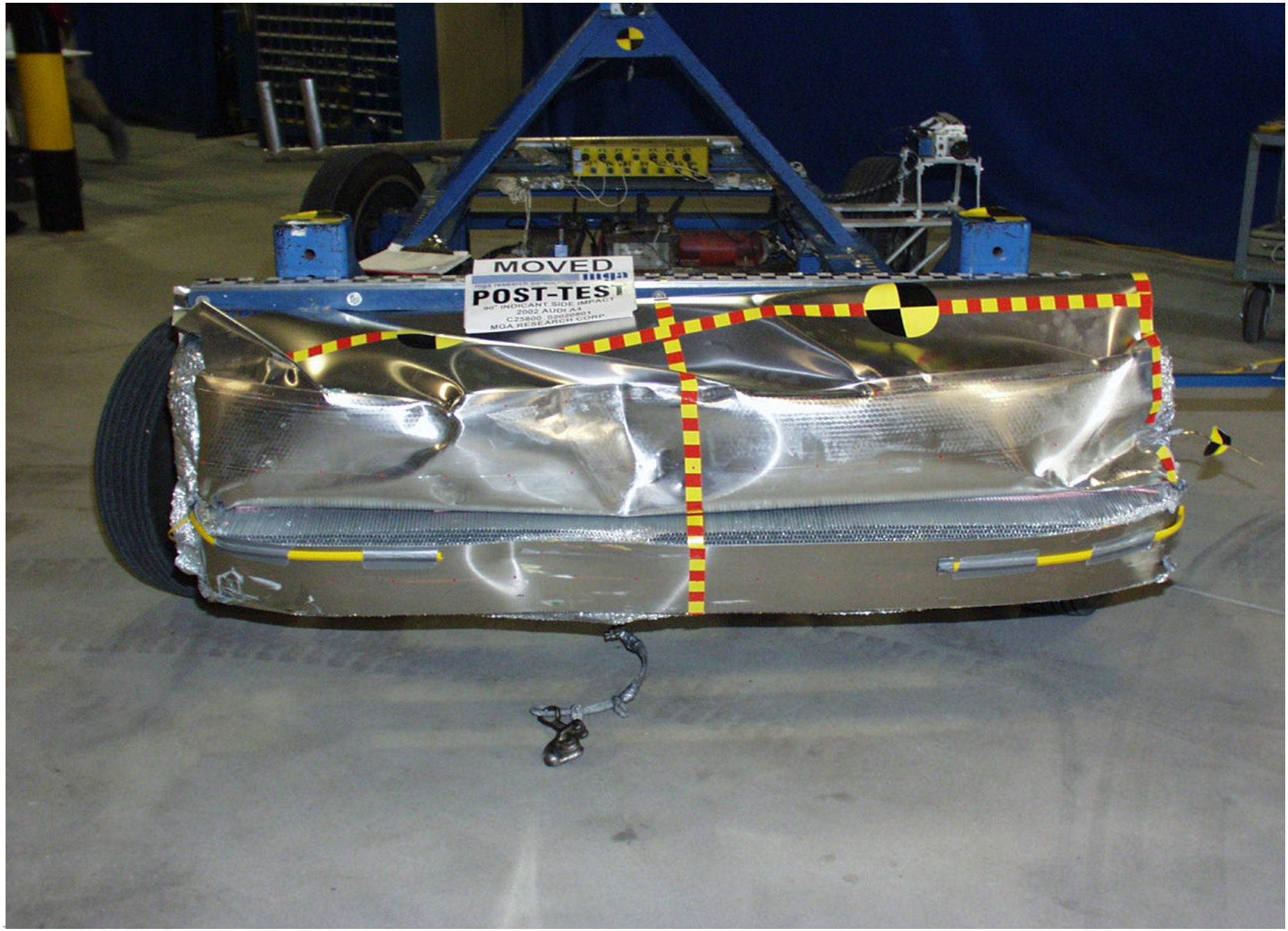


Pre-Test MDB Top View

Post-Test MDB Top View



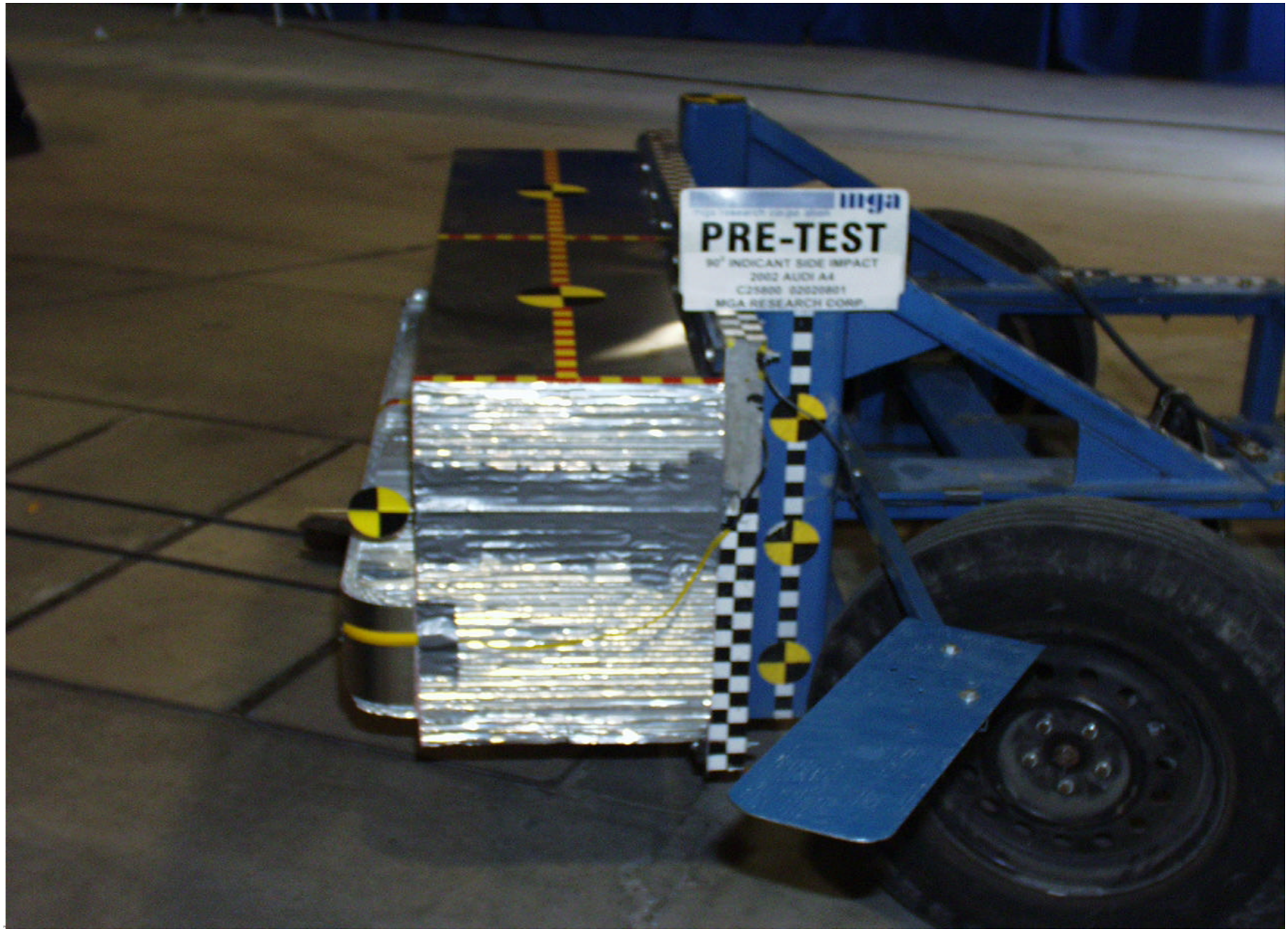
Pre-Test MDB Front View



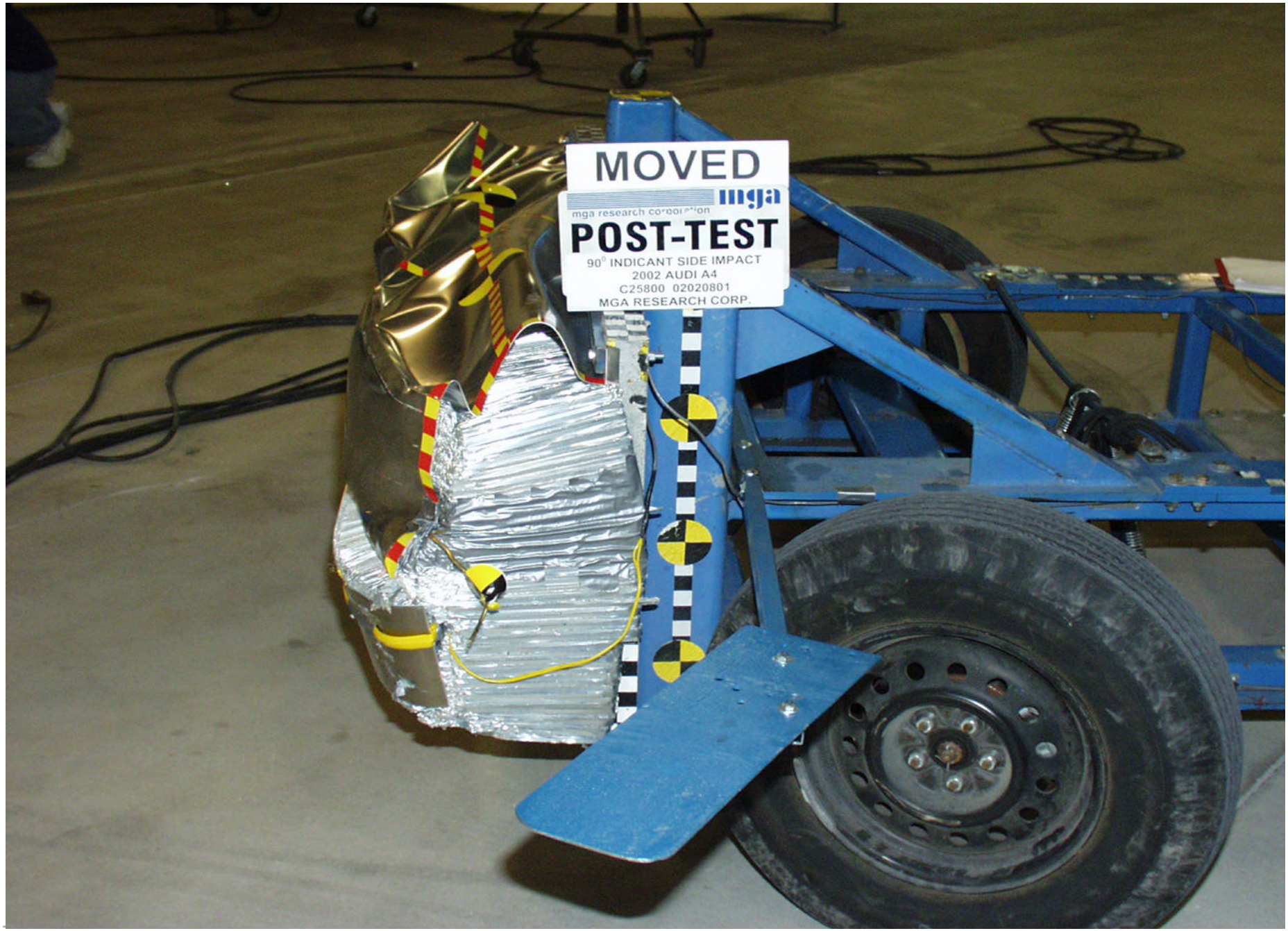
Post-Test MDB Front View

Pre-Test MDB Right Side View

Post-Test MDB Right Side View



Pre-Test MDB Left Side View



Post-Test MDB Left Side View

Pre-Test Driver Dummy Right Side View

Post-Test Driver Dummy Right Side View

Pre-Test Driver Dummy Left Side View

Post-Test Driver Dummy Left Side View

Pre-Test Driver Dummy Left Side View (Door Open)

Pre-Test Driver Dummy Shoulder and Door Top View

Post-Test Driver Dummy Shoulder and Door Top View

Post-Test Driver Dummy Contact

Post-Test Driver Dummy Head Contact

Pre-Test Passenger Dummy Right Side View

Post-Test Passenger Dummy Right Side View

Pre-Test Passenger Dummy Left Side View

Post-Test Passenger Dummy Left Side View

Pre-Test Passenger Dummy Left Side View (Door Open)

Pre-Test Passenger Dummy Shoulder and Door Top View

Post-Test Passenger Dummy Shoulder and Door Top View

Post-Test Passenger Dummy Contact

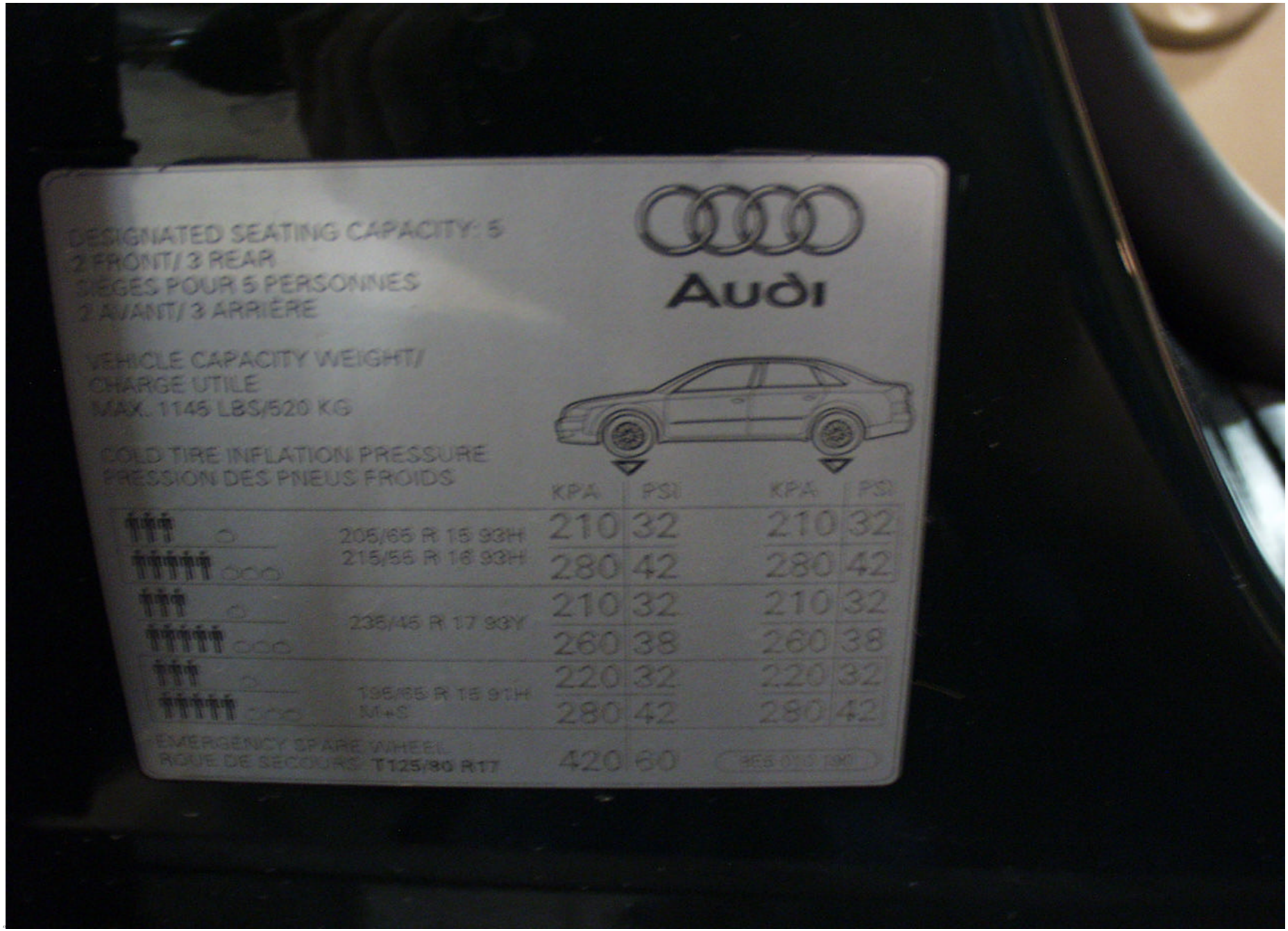
Post-Test Passenger Dummy Head Contact

Pre-Test Left Front Impact Point on Vehicle

Post-Test Left Front Impact Point on Vehicle

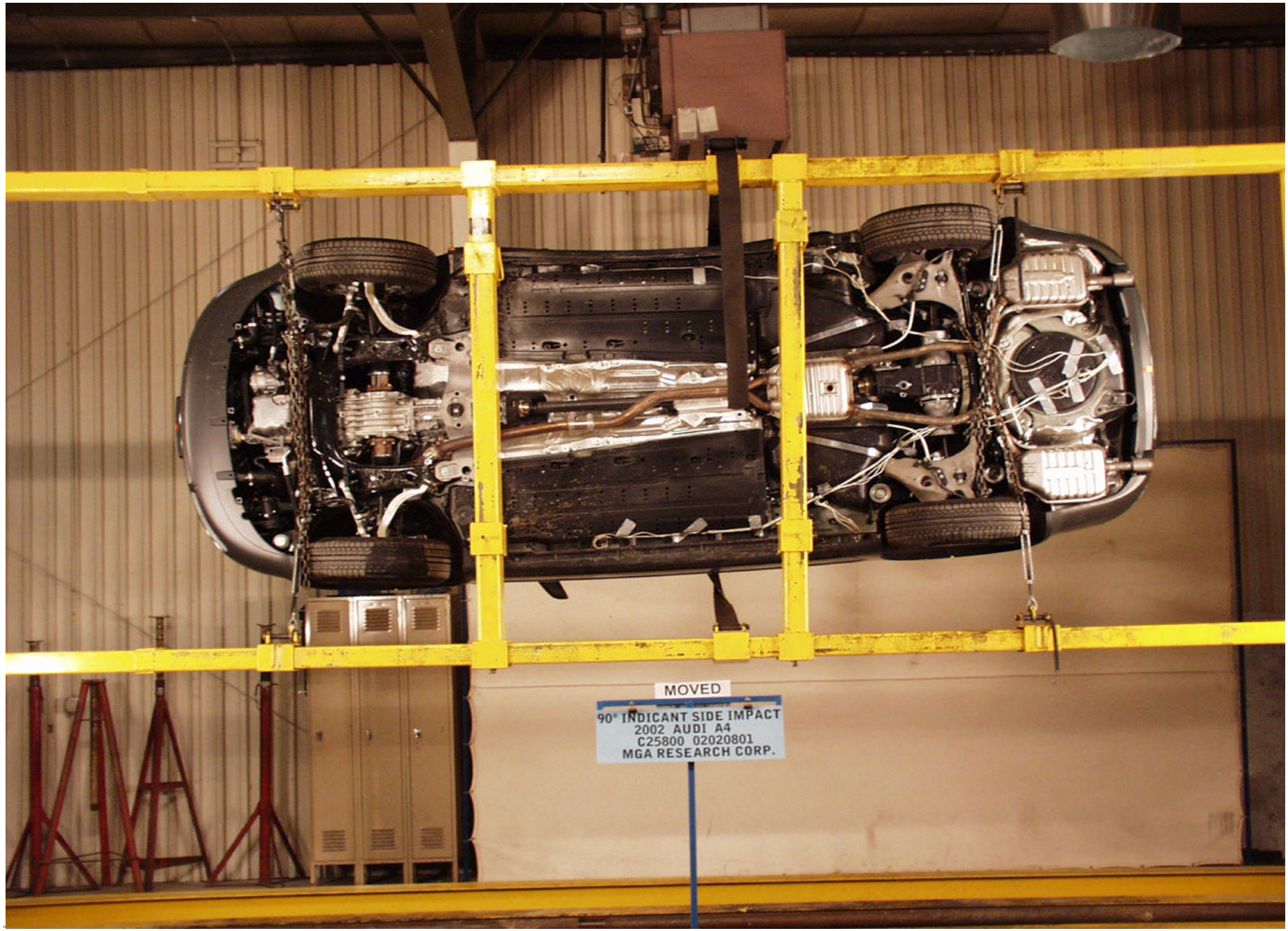
Impact

Vehicle Certification Label



A-43.

Tire Placard


MOVED
90° INDICANT SIDE IMPACT
2002 AUDI A4
C25800 02020801
MGA RESEARCH CORP.

Rollover 90

Rollover 180

Rollover 270

Rollover 360

Left Front Attitude Point

Right Front Attitude Point

Right Rear Attitude Point

Left Rear Attitude Point

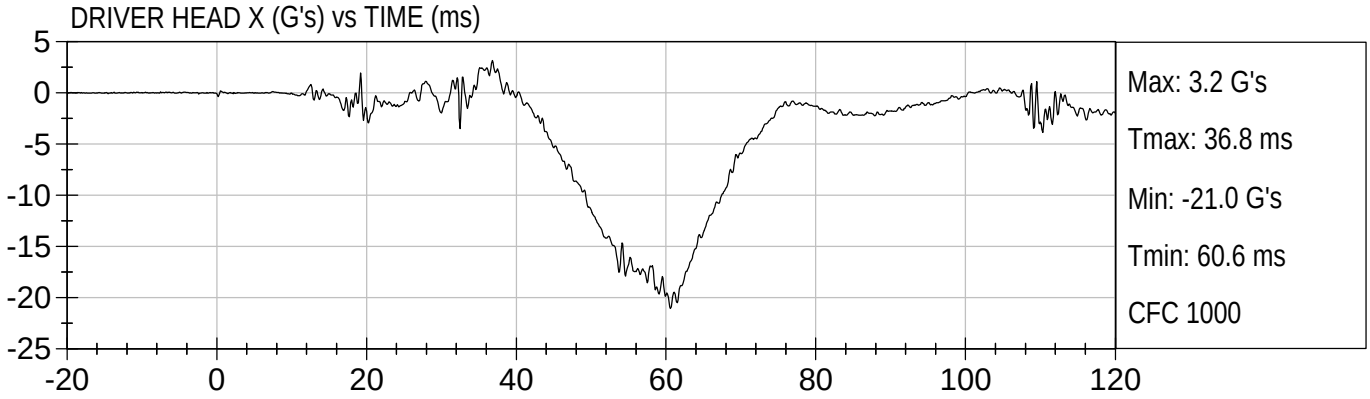
APPENDIX B

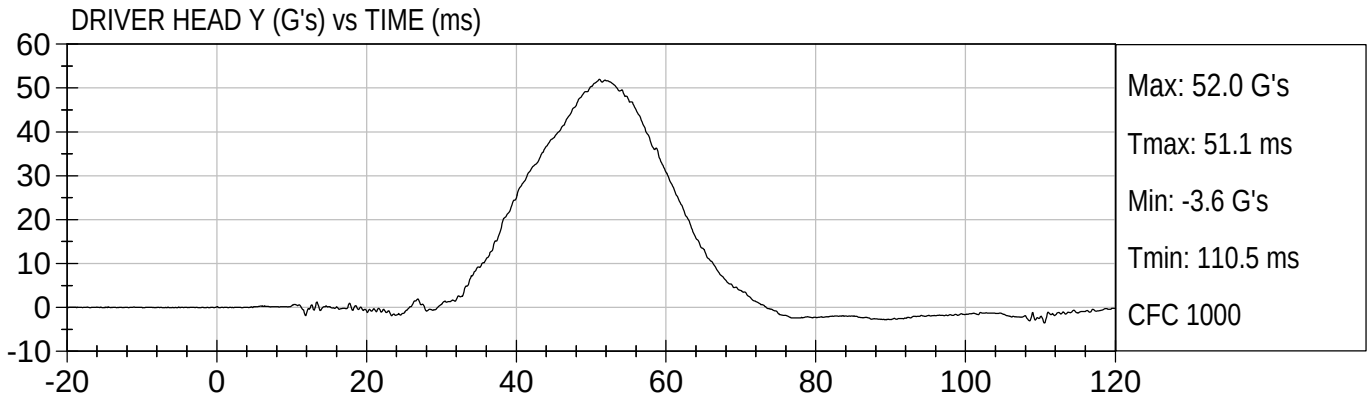
SID, VEHICLE, AND MDB RESPONSE DATA

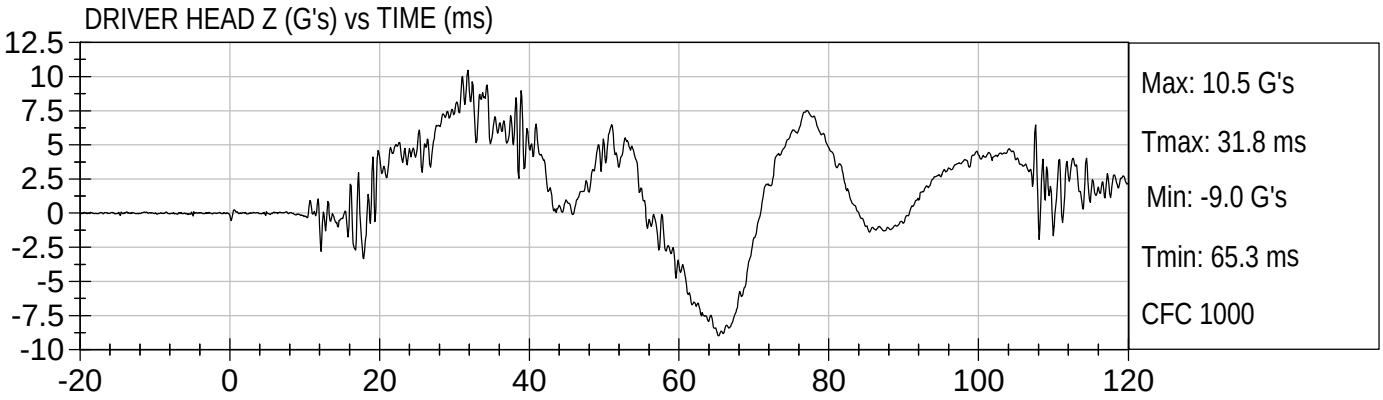
TABLE OF DATA PLOTS

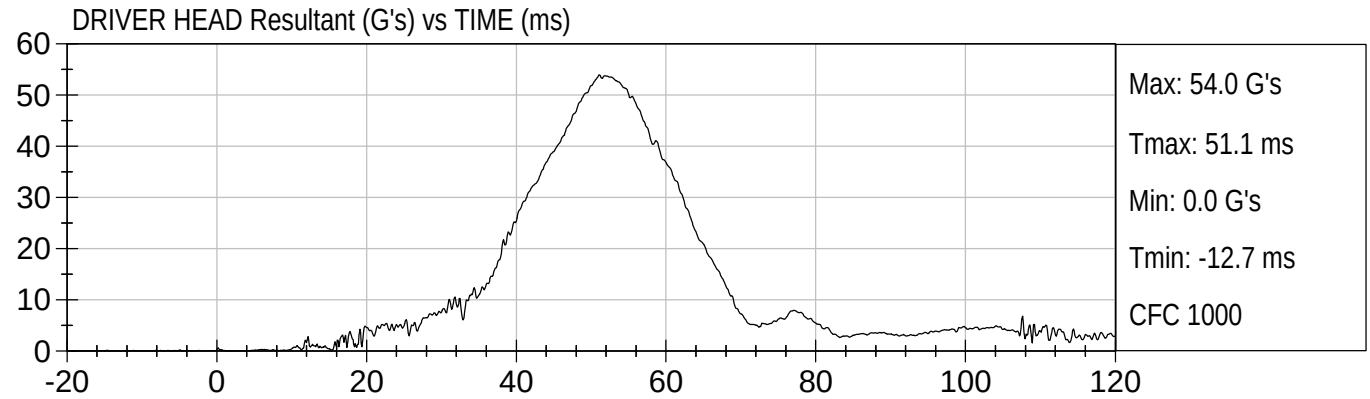
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



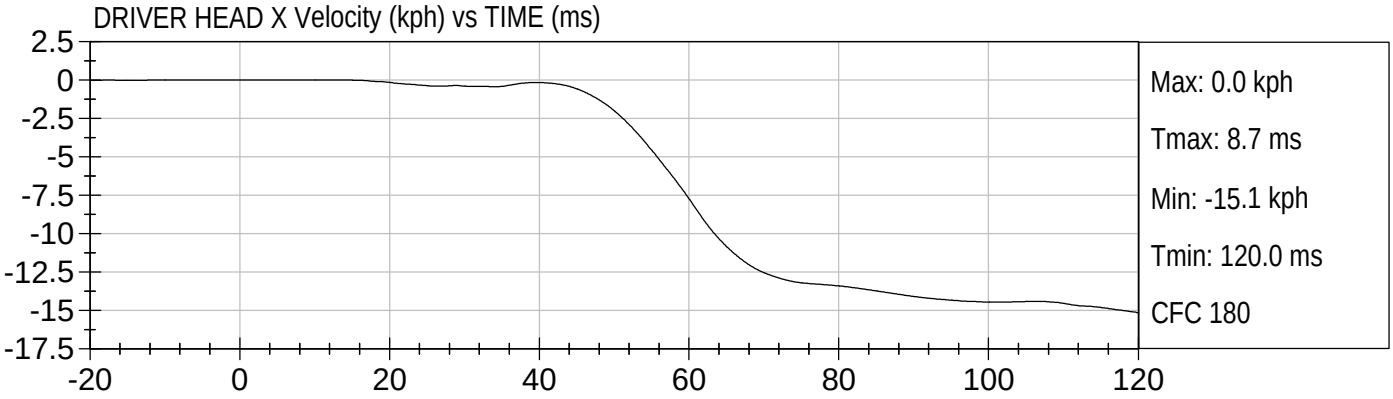


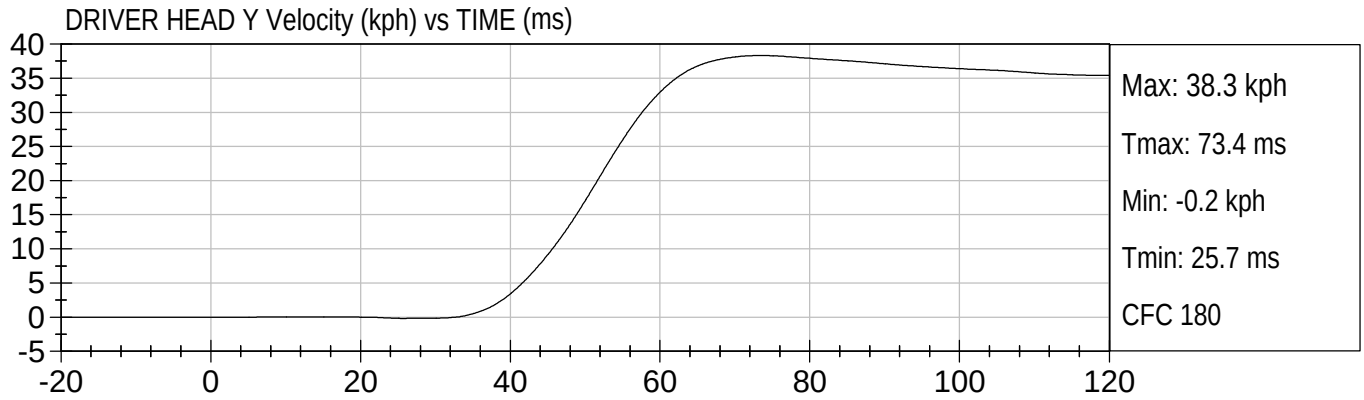


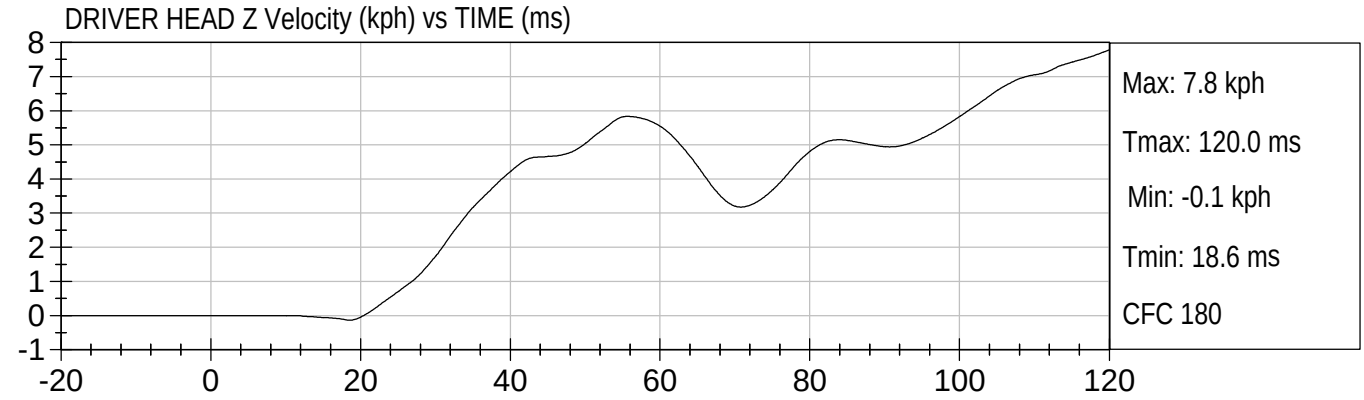


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



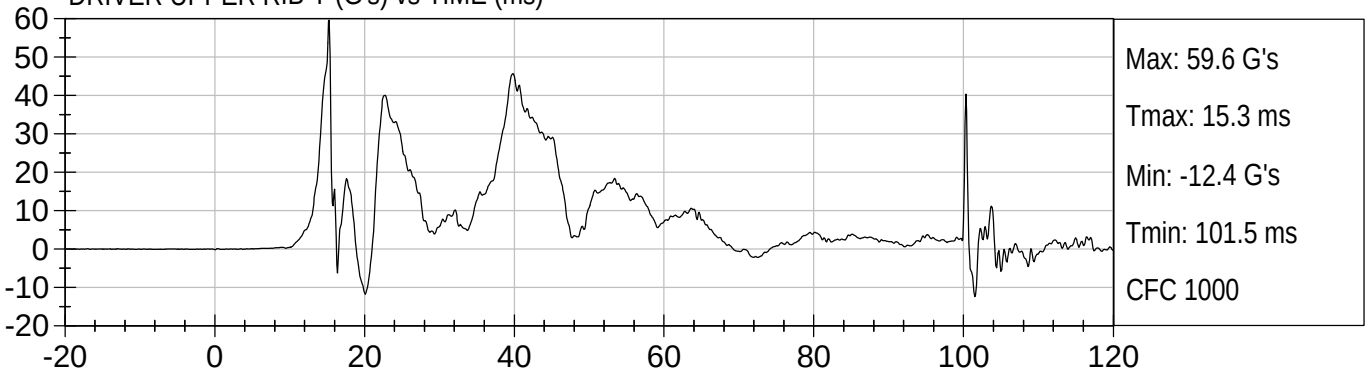




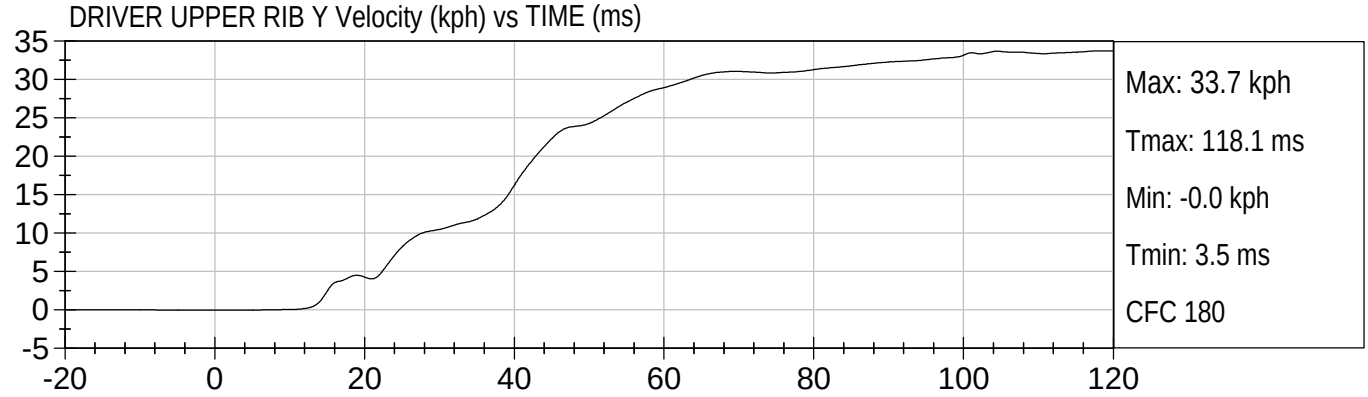
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

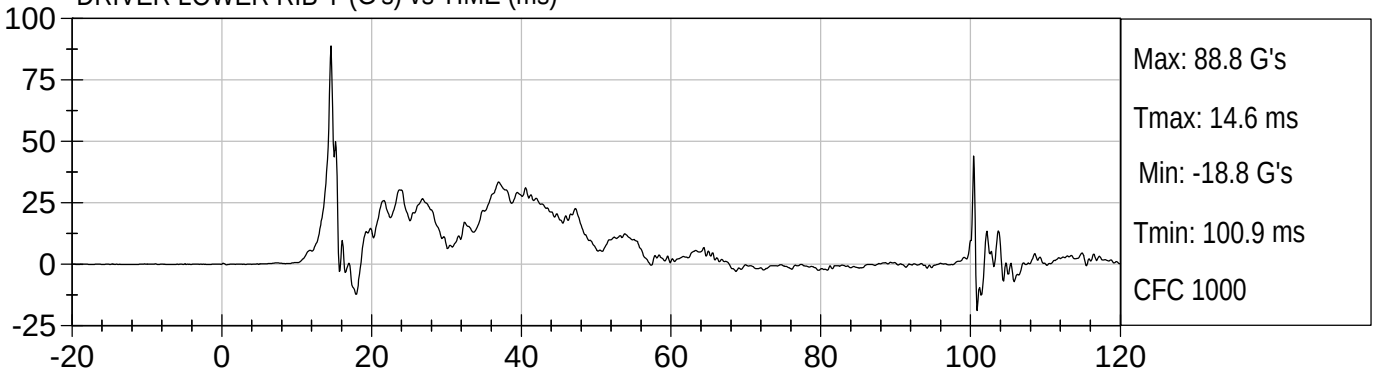
DRIVER UPPER RIB Y (G's) vs TIME (ms)



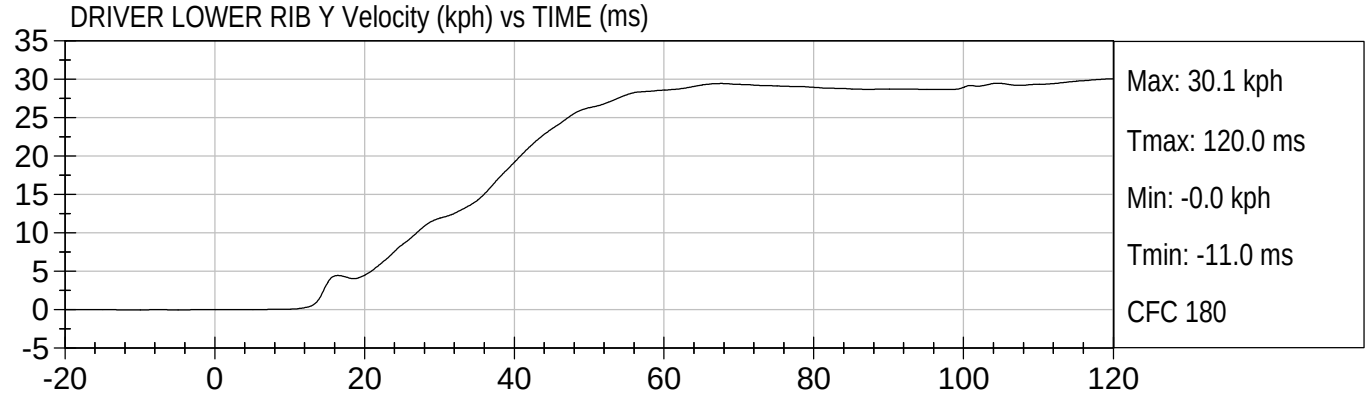
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Y (G's) vs TIME (ms)



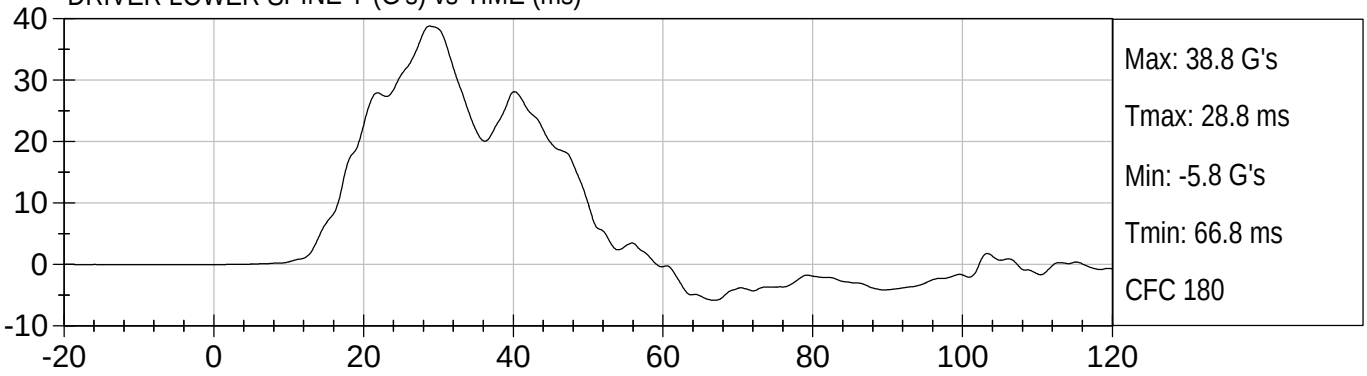
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



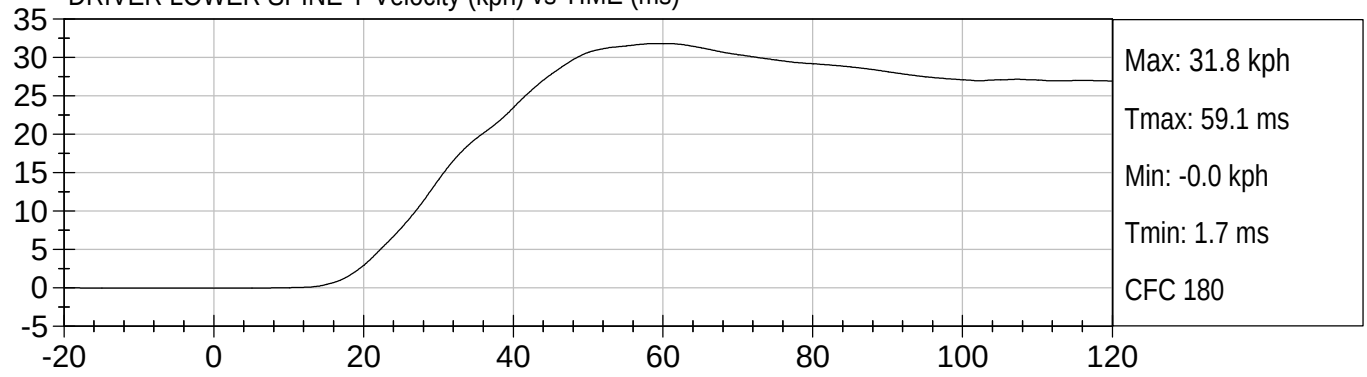
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

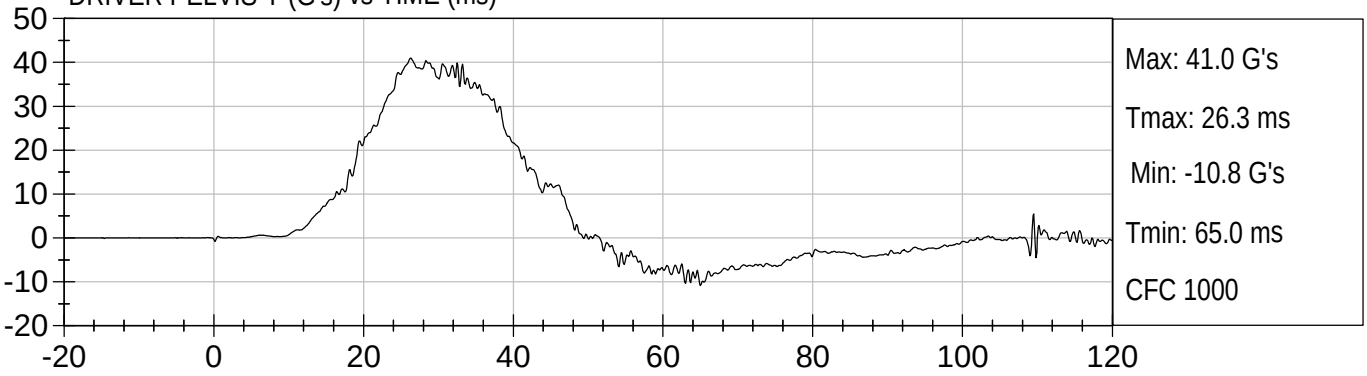
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



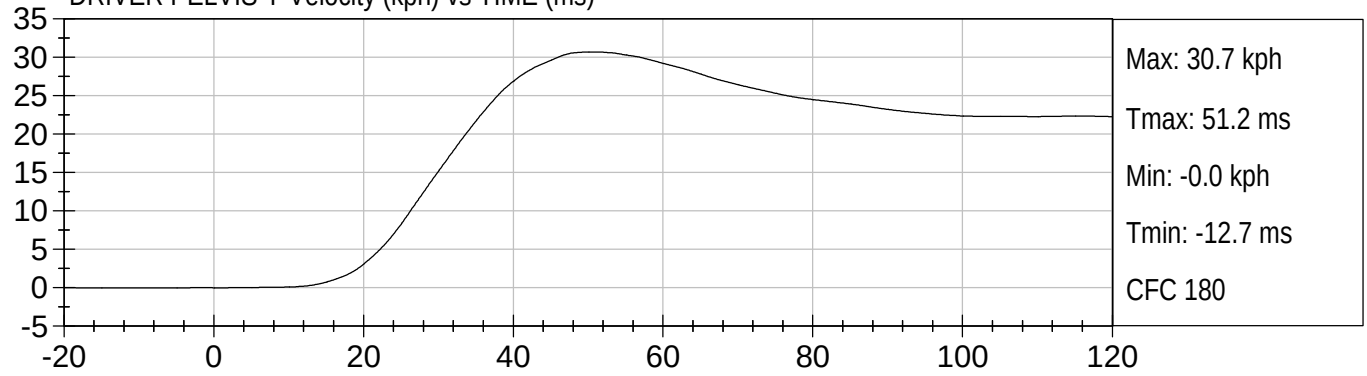
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



DRIVER PELVIS Y (G's) vs TIME (ms)

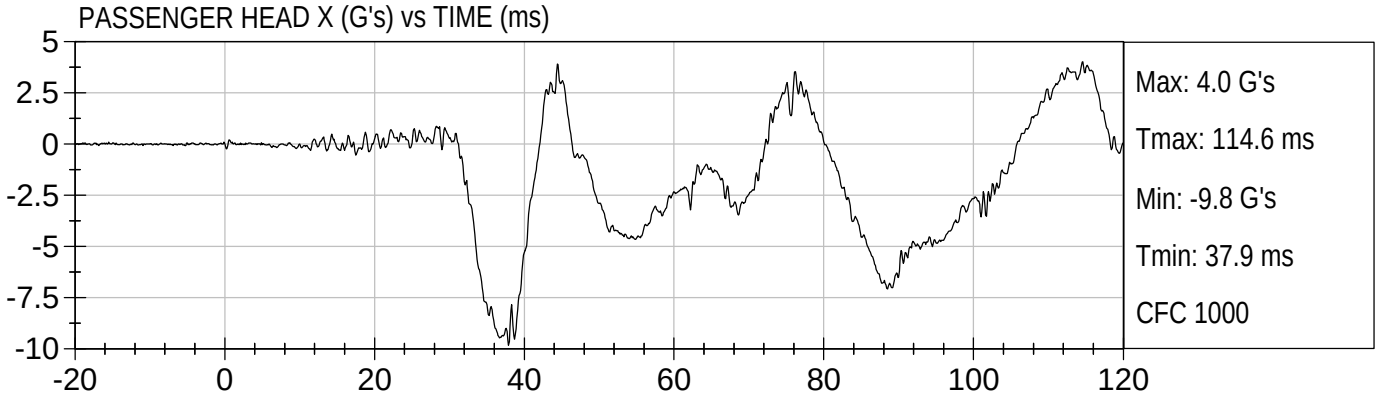


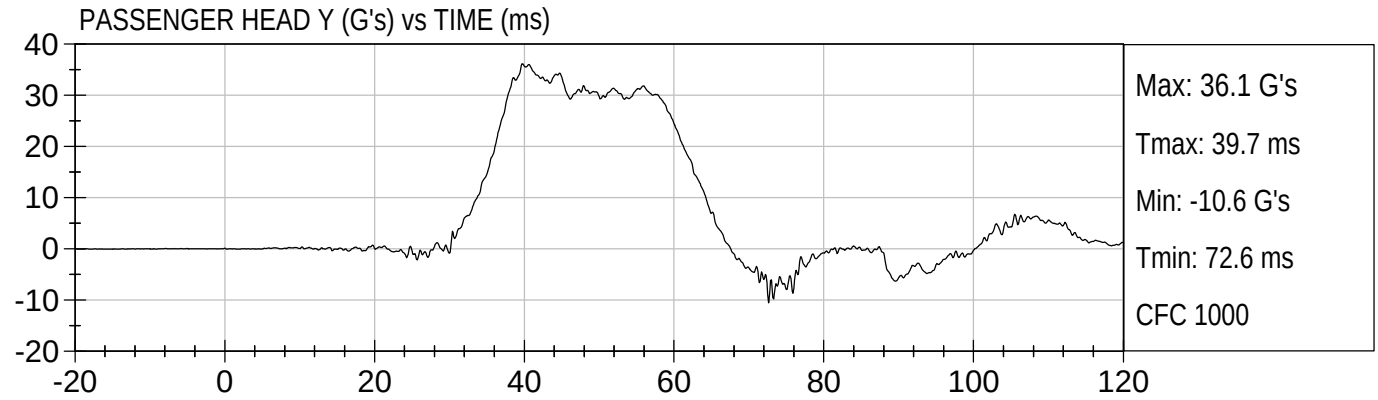
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)

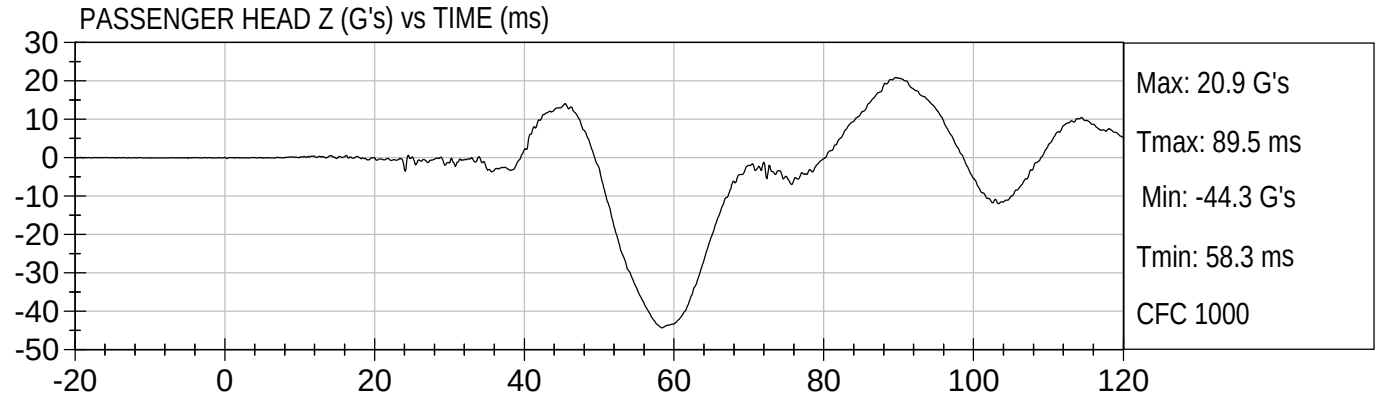


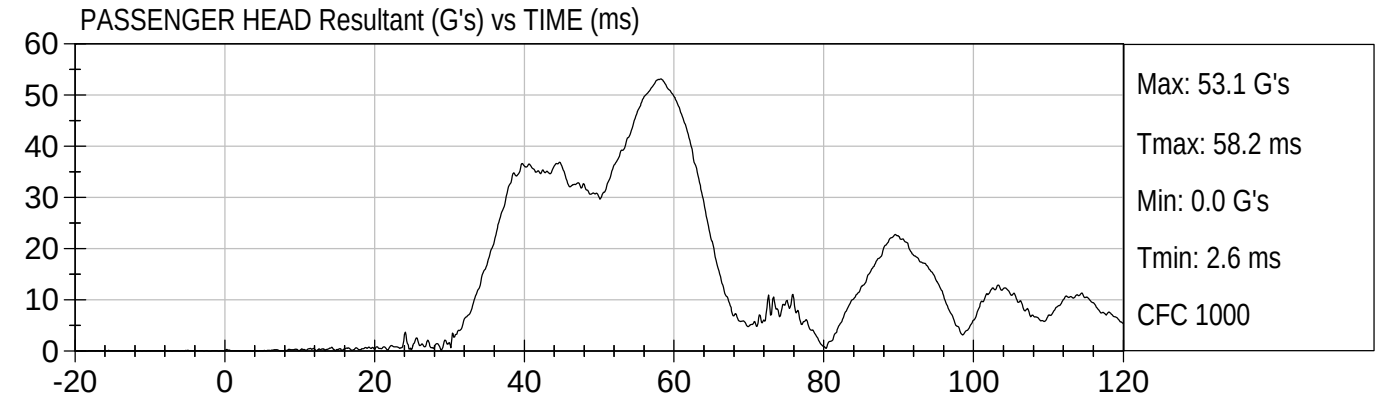
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



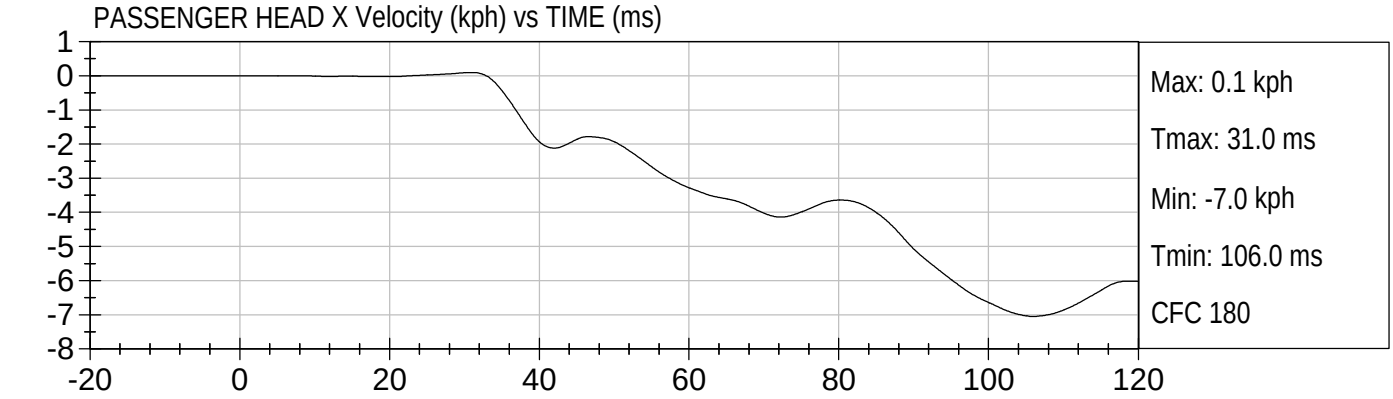


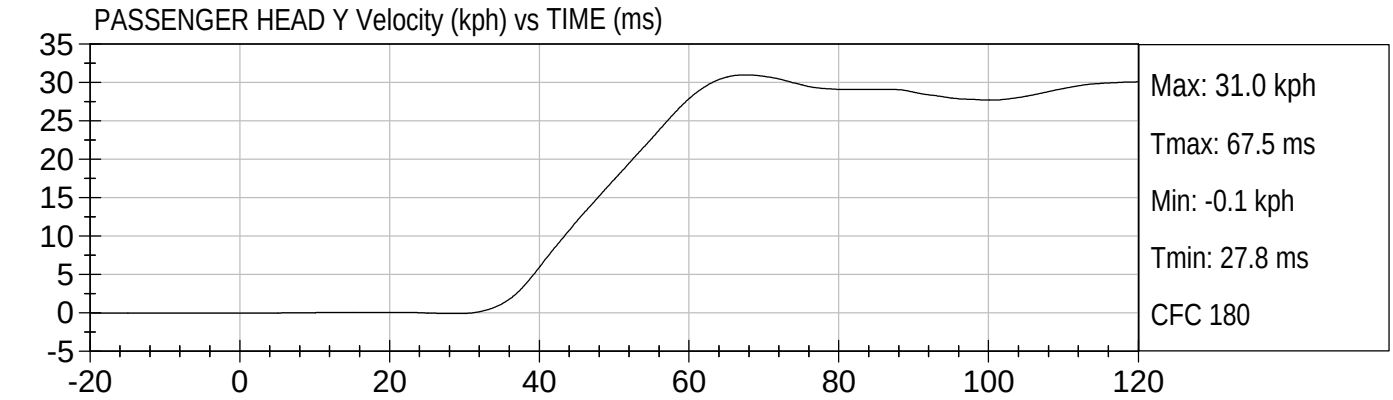


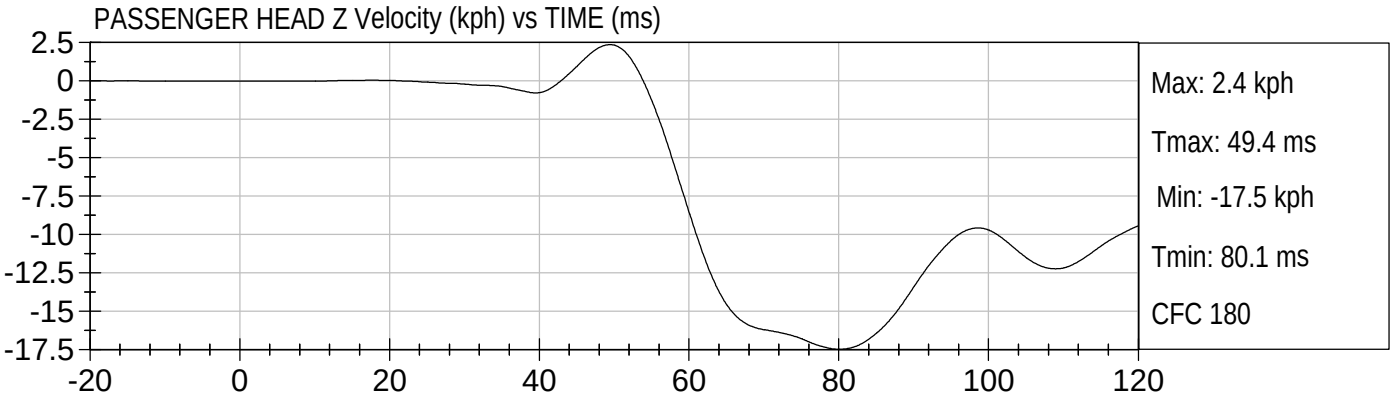


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



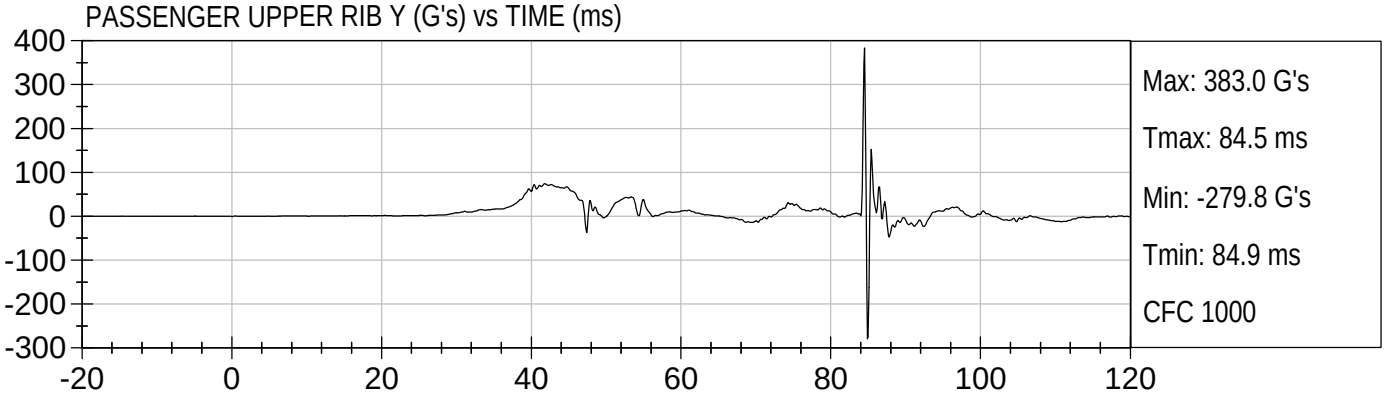




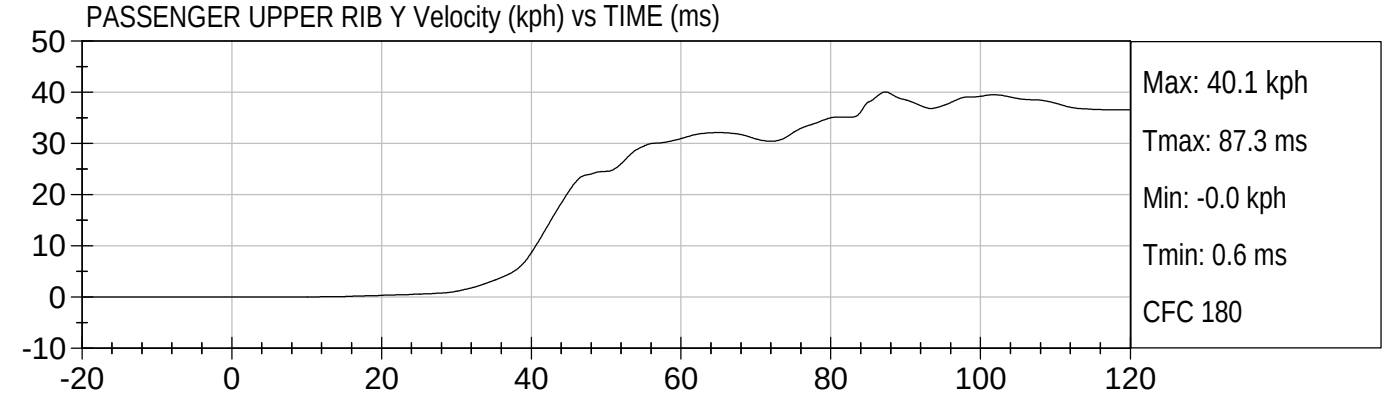
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

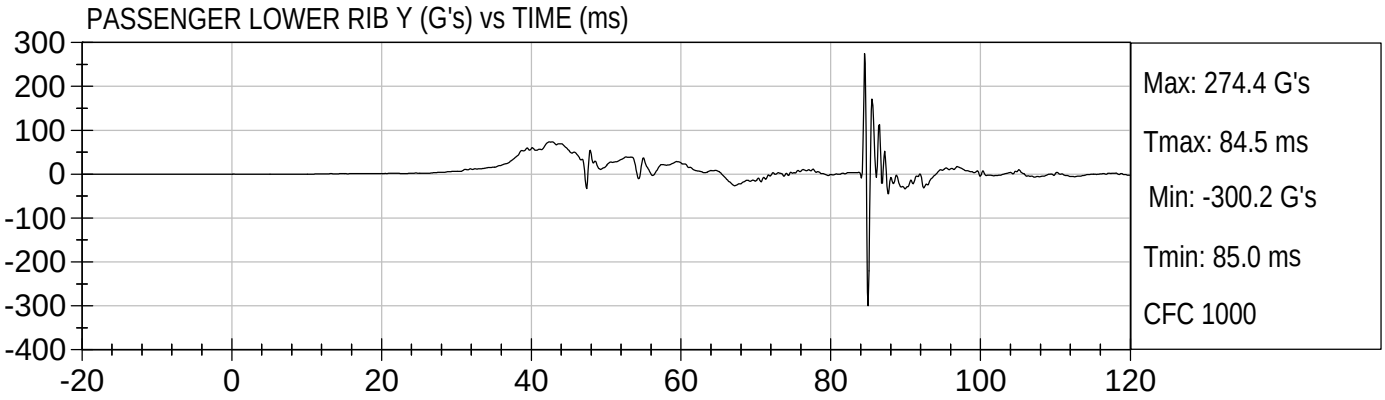
PASSENGER UPPER RIB Y (G's) vs TIME (ms)



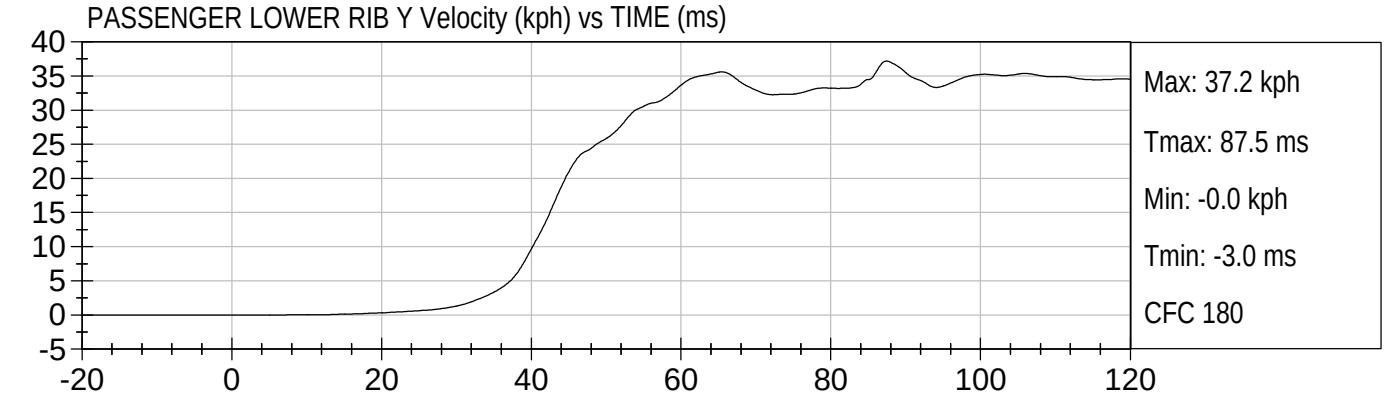
PASSENGER UPPER RIB Y Velocity (kph) vs TIME (ms)



PASSENGER LOWER RIB Y (G's) vs TIME (ms)



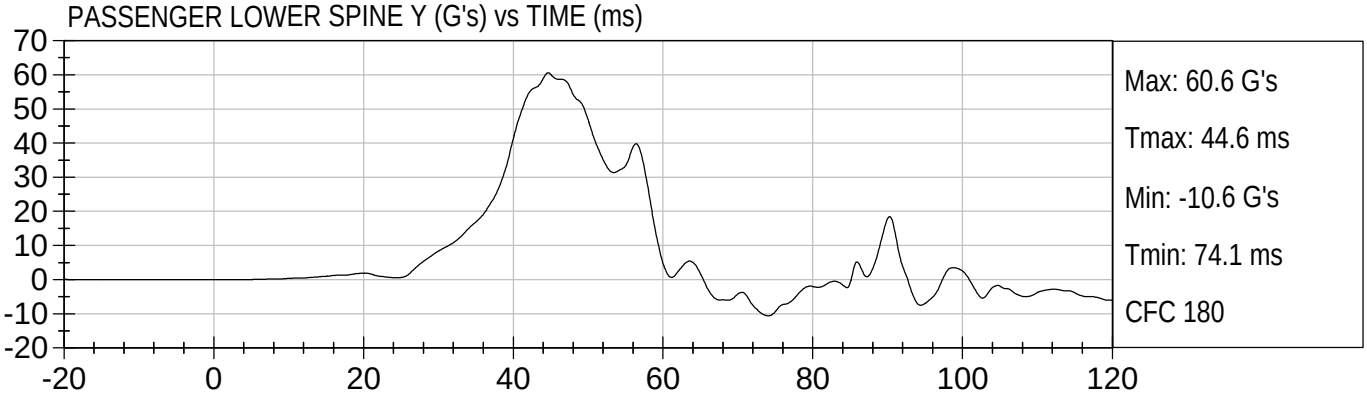
PASSENGER LOWER RIB Y Velocity (kph) vs TIME (ms)



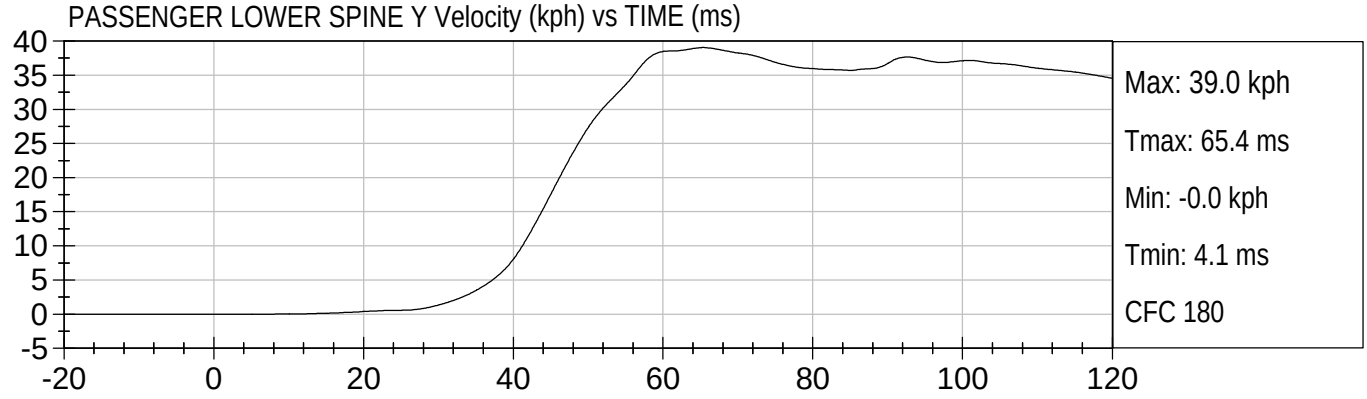
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

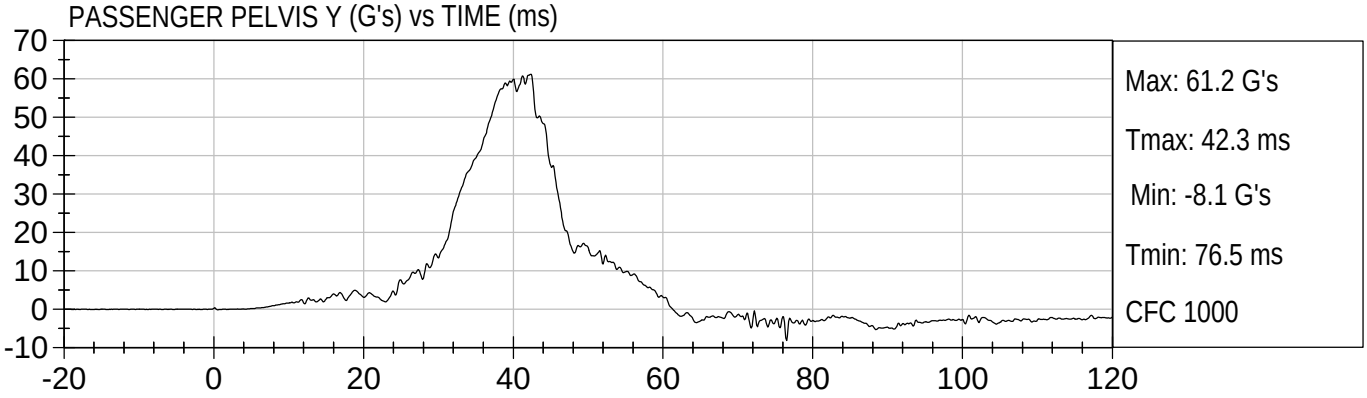
PASSENGER LOWER SPINE Y (G's) vs TIME (ms)



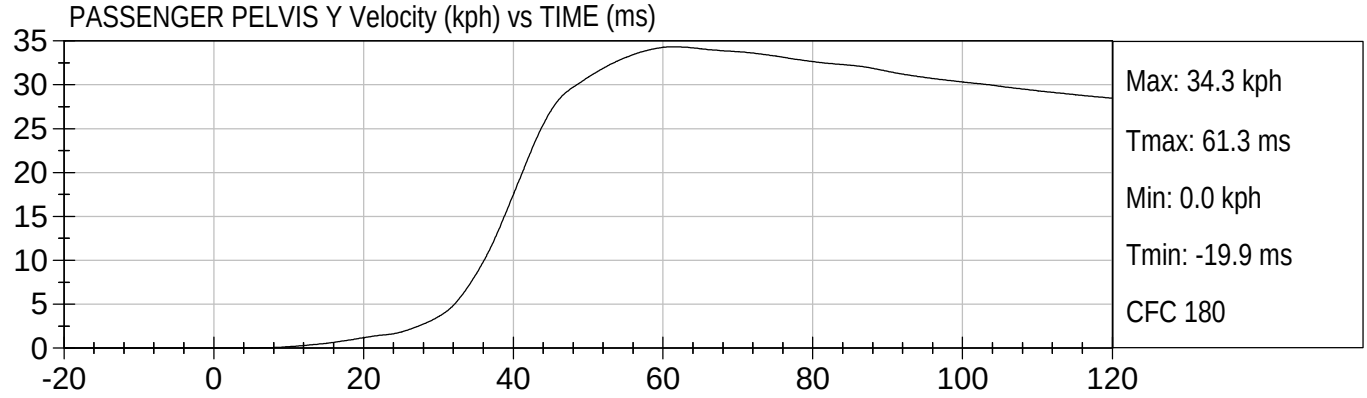
PASSENGER LOWER SPINE Y Velocity (kph) vs TIME (ms)



PASSENGER PELVIS Y (G's) vs TIME (ms)



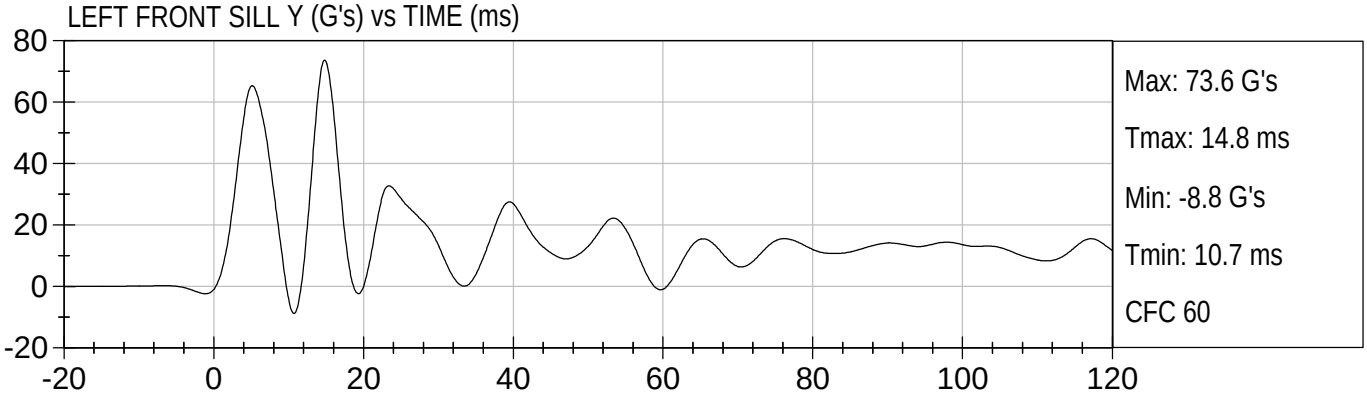
PASSENGER PELVIS Y Velocity (kph) vs TIME (ms)



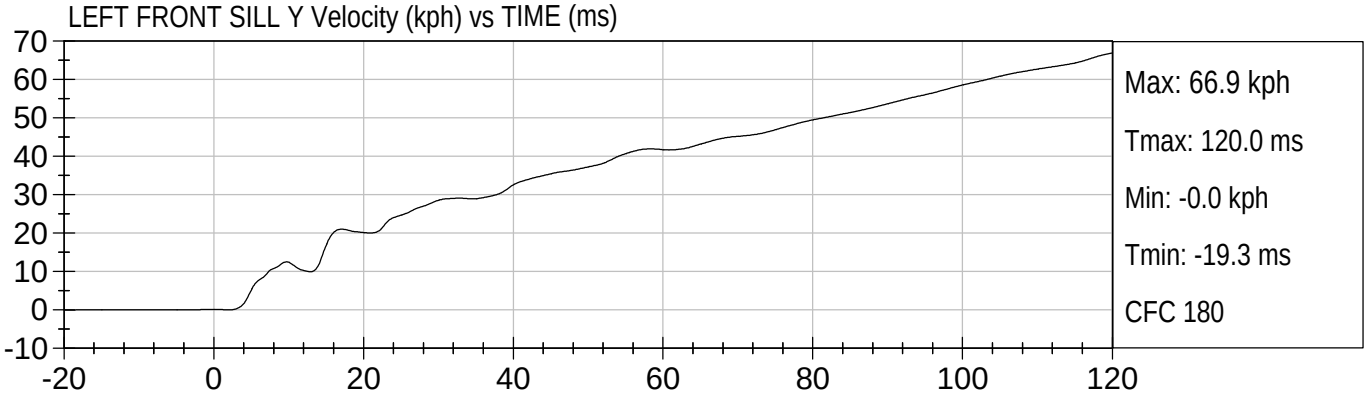
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

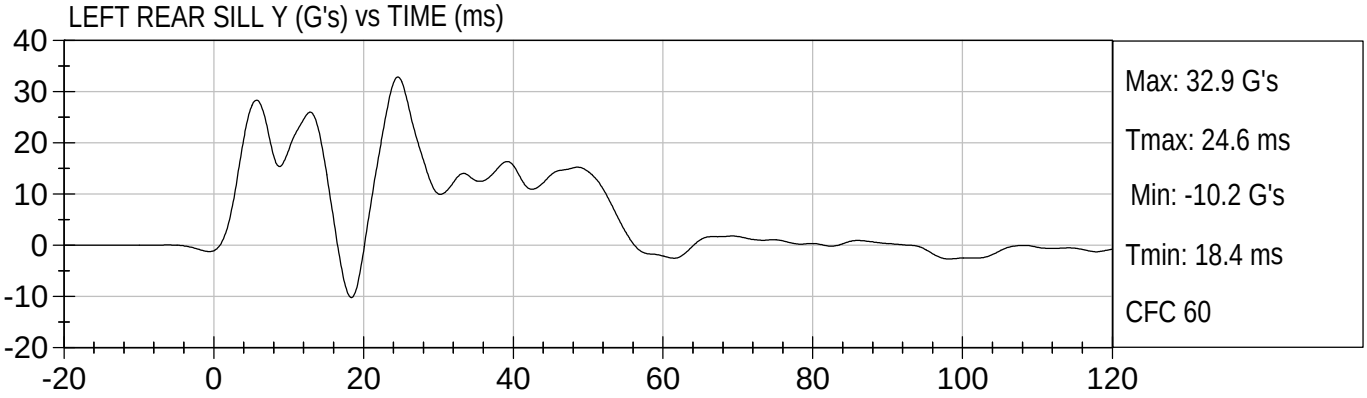
LEFT FRONT SILL Y (G's) vs TIME (ms)



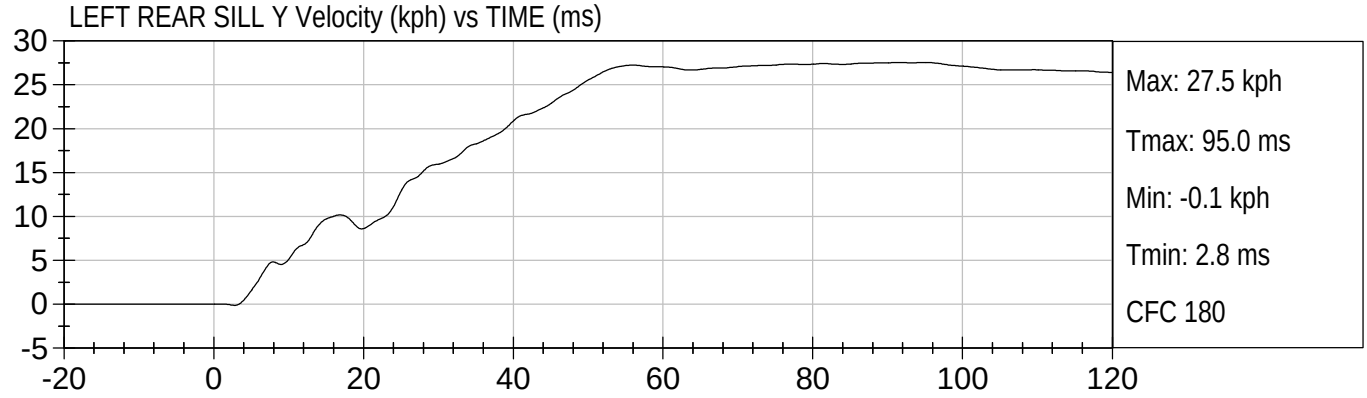
LEFT FRONT SILL Y Velocity (kph) vs TIME (ms)



LEFT REAR SILL Y (G's) vs TIME (ms)

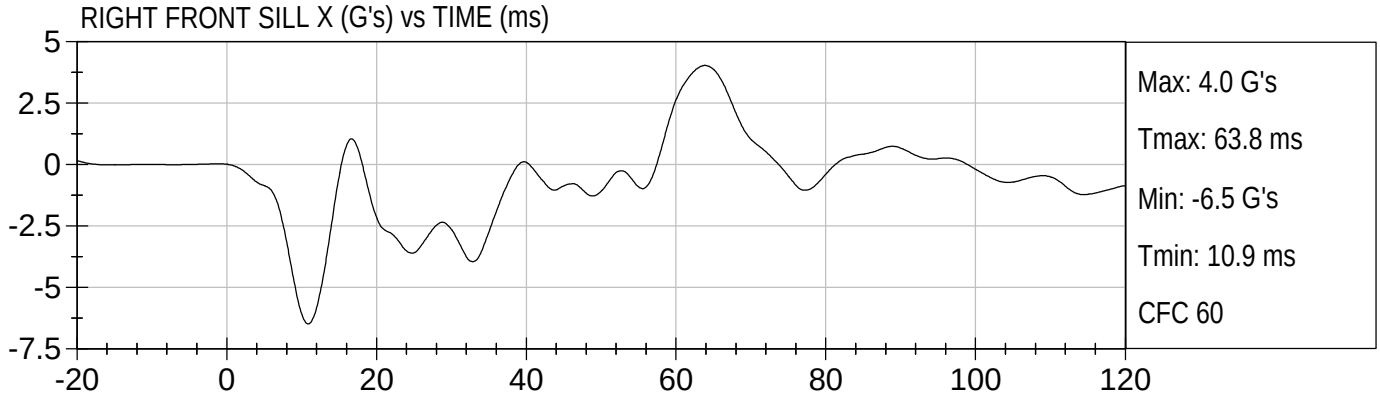


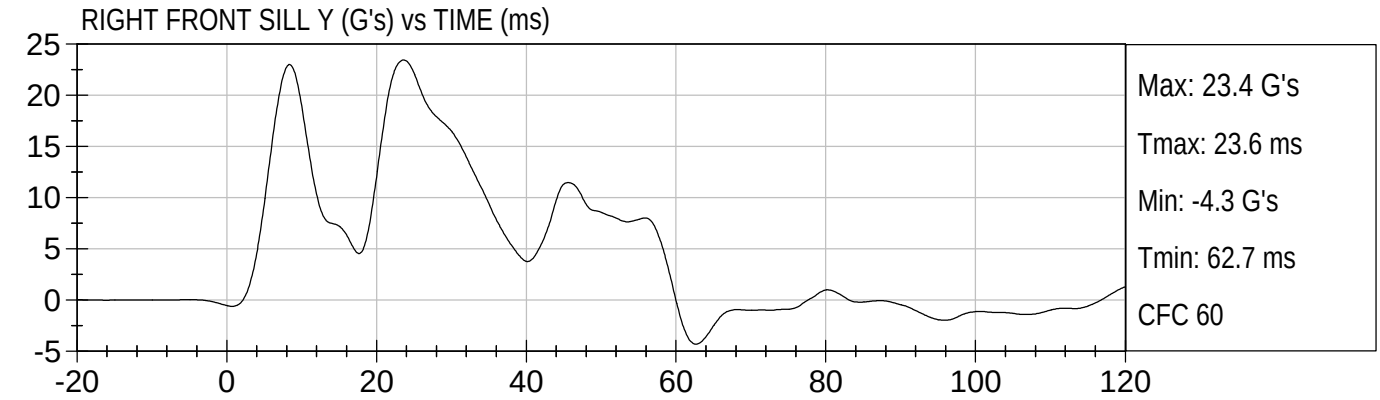
LEFT REAR SILL Y Velocity (kph) vs TIME (ms)

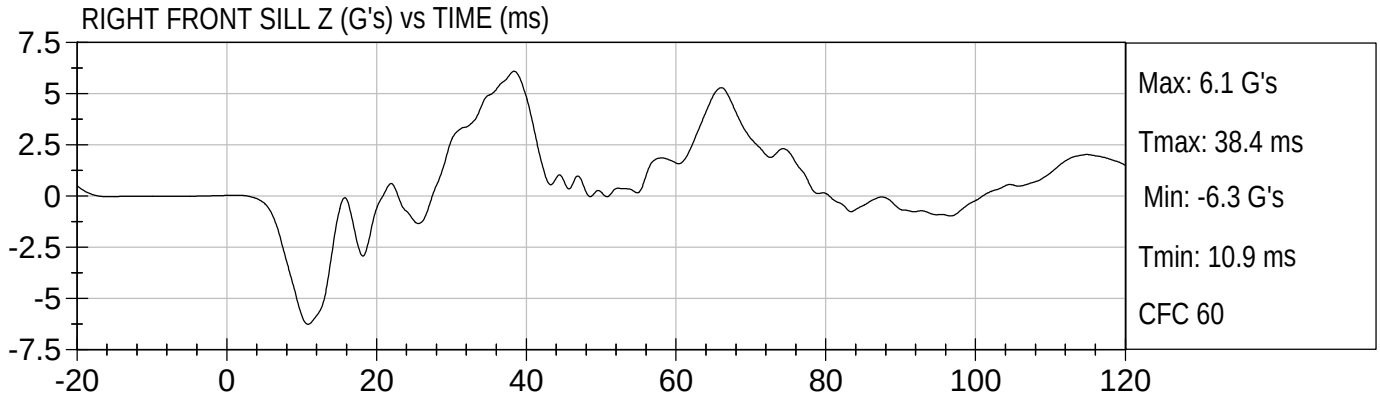


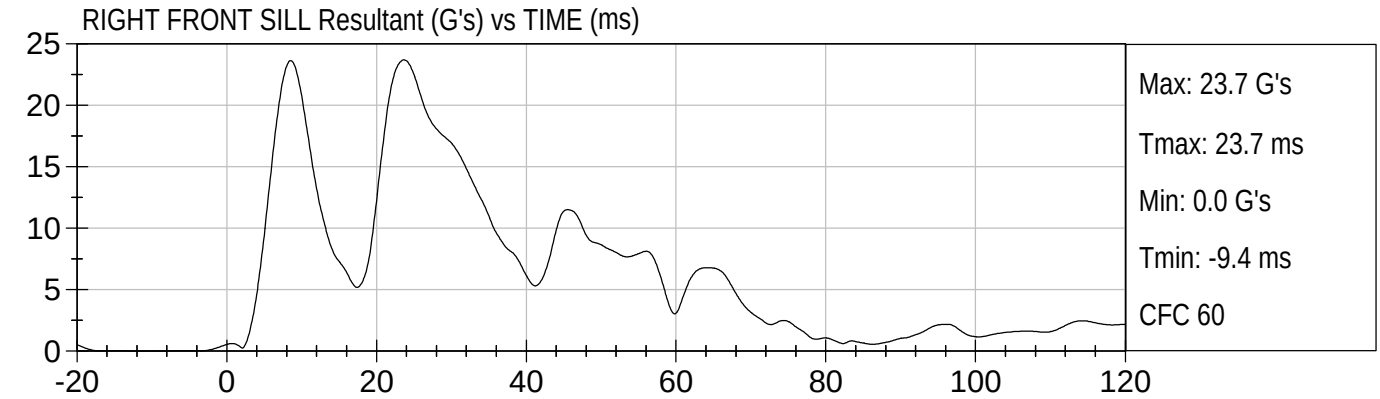
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



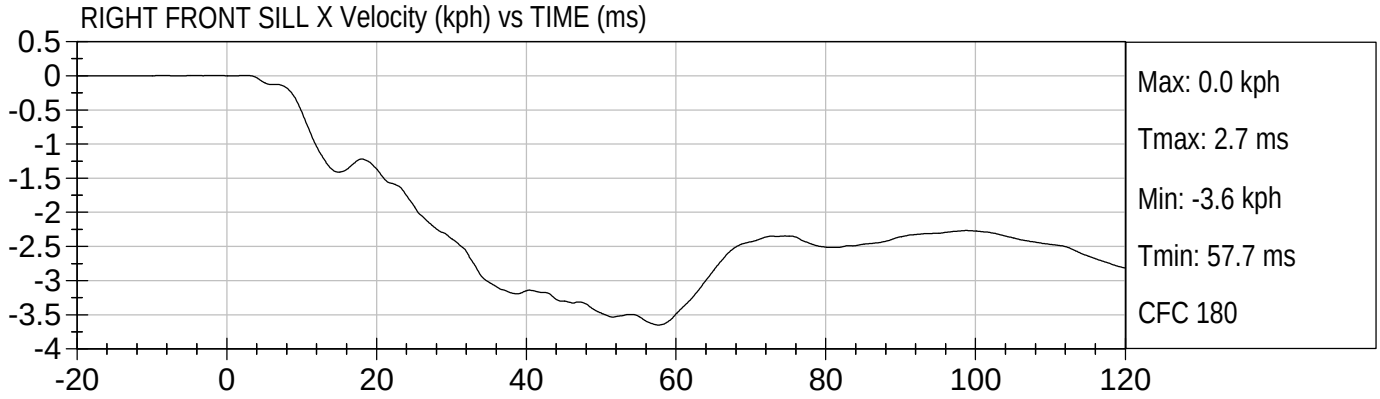


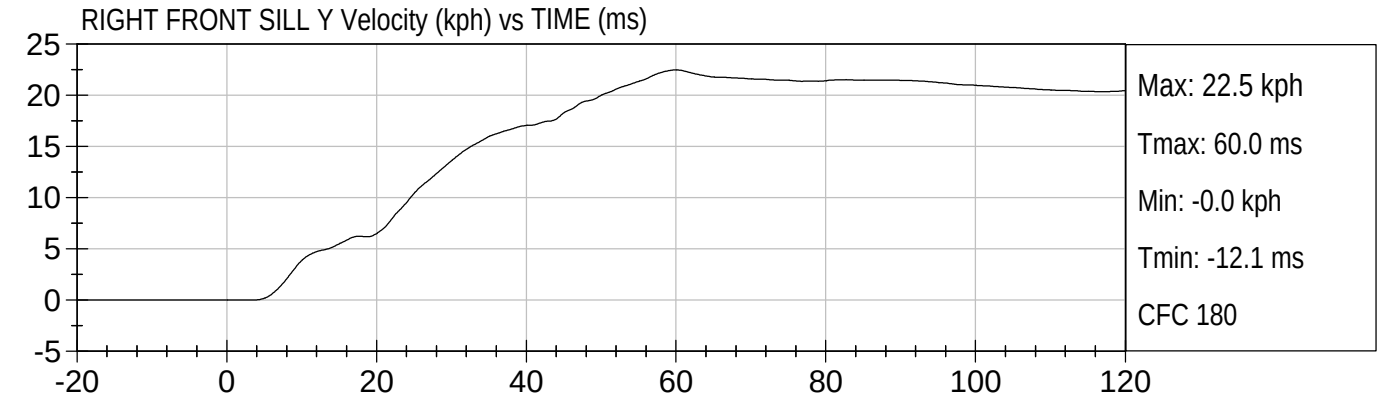


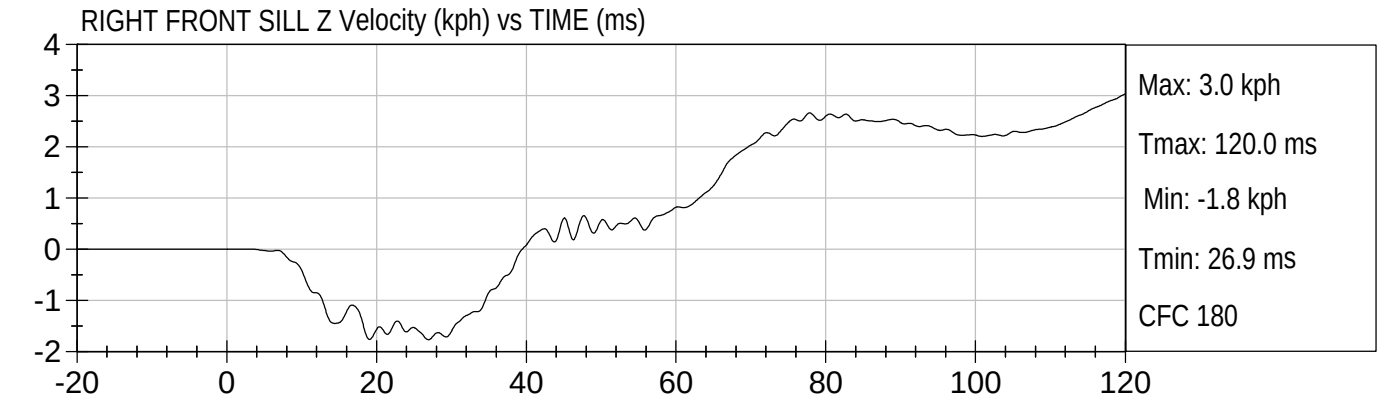


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



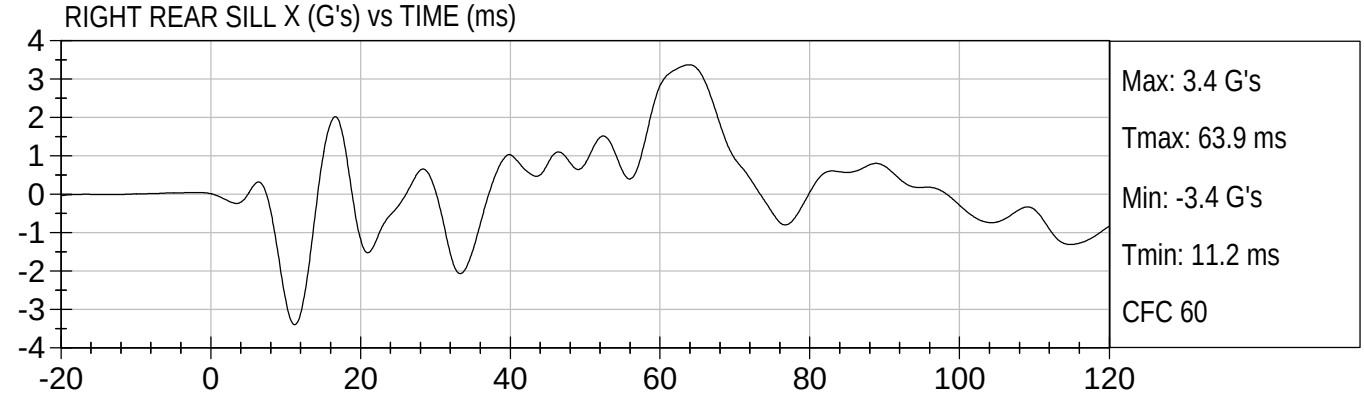




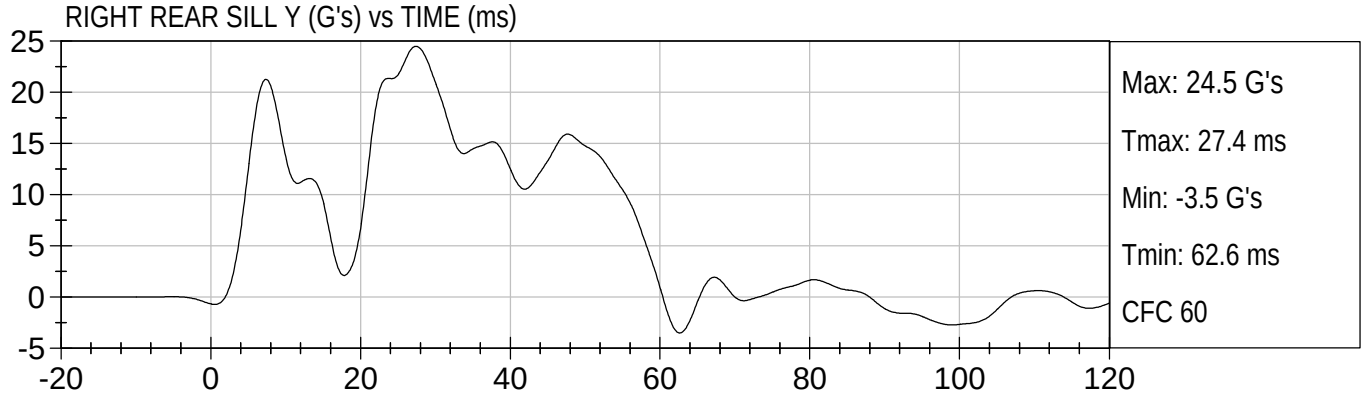
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

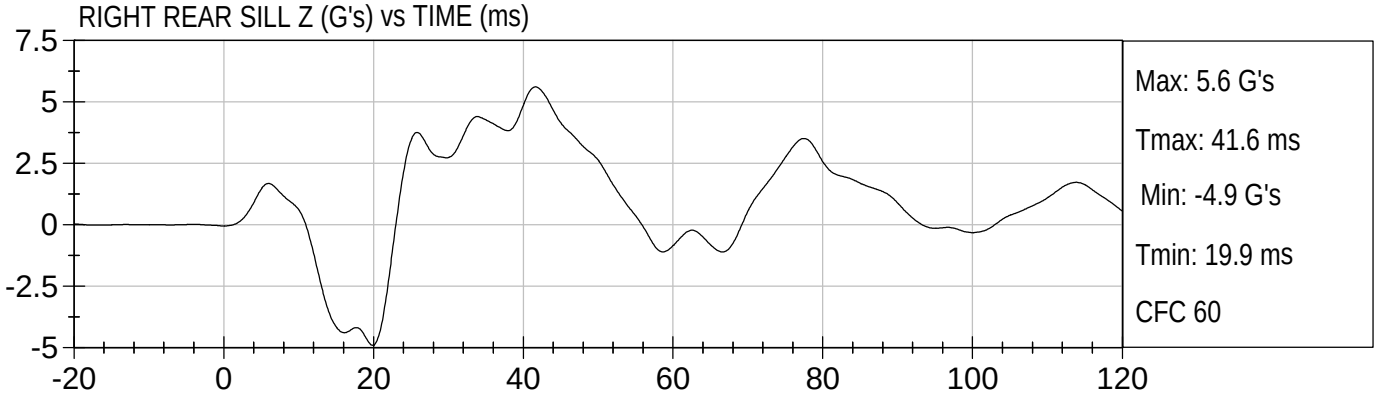
RIGHT REAR SILL X (G's) vs TIME (ms)



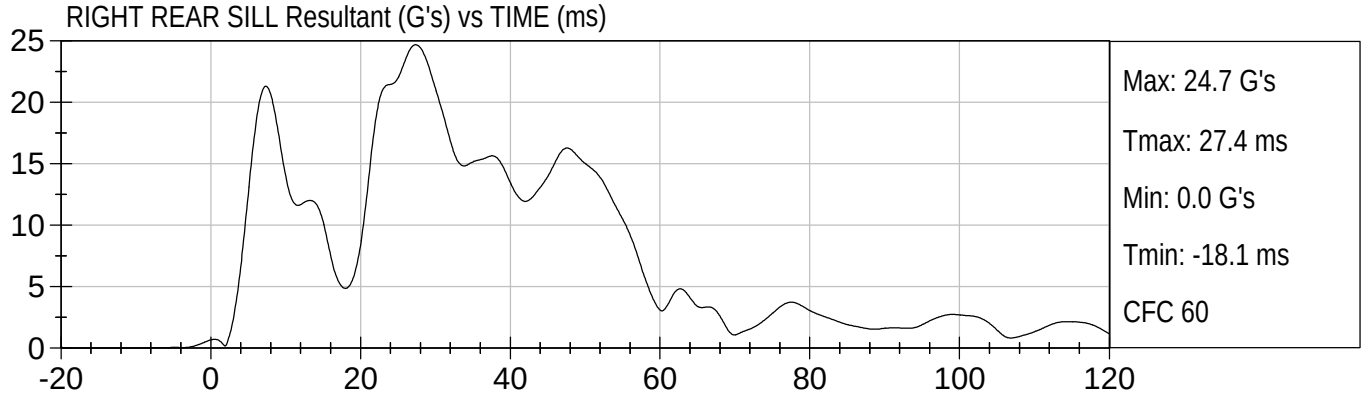
RIGHT REAR SILL Y (G's) vs TIME (ms)



RIGHT REAR SILL Z (G's) vs TIME (ms)

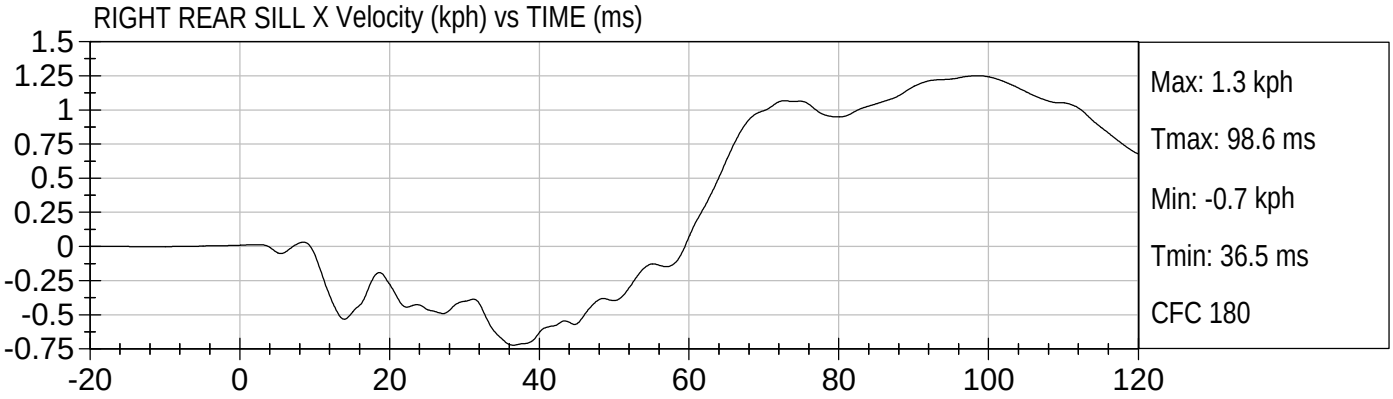


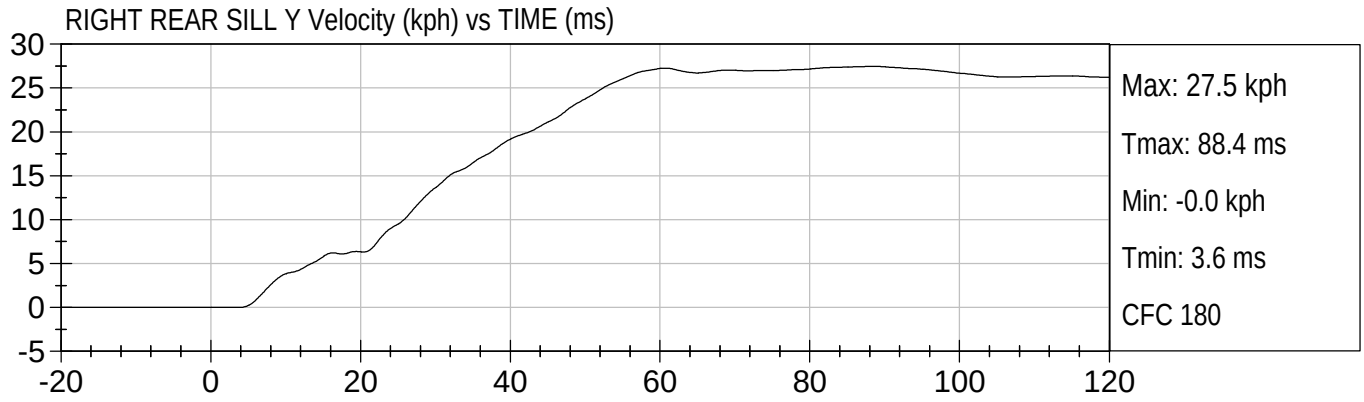
RIGHT REAR SILL Resultant (G's) vs TIME (ms)

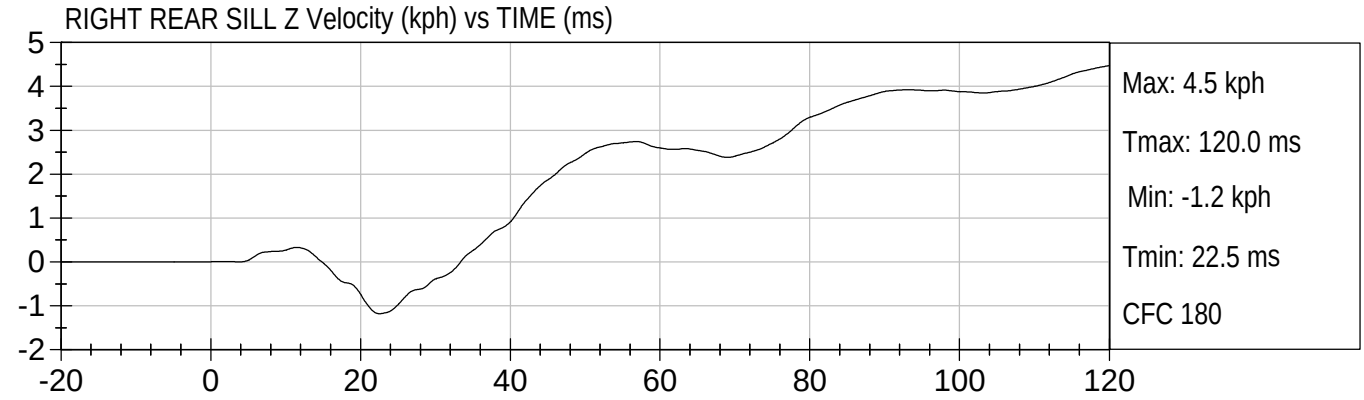


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



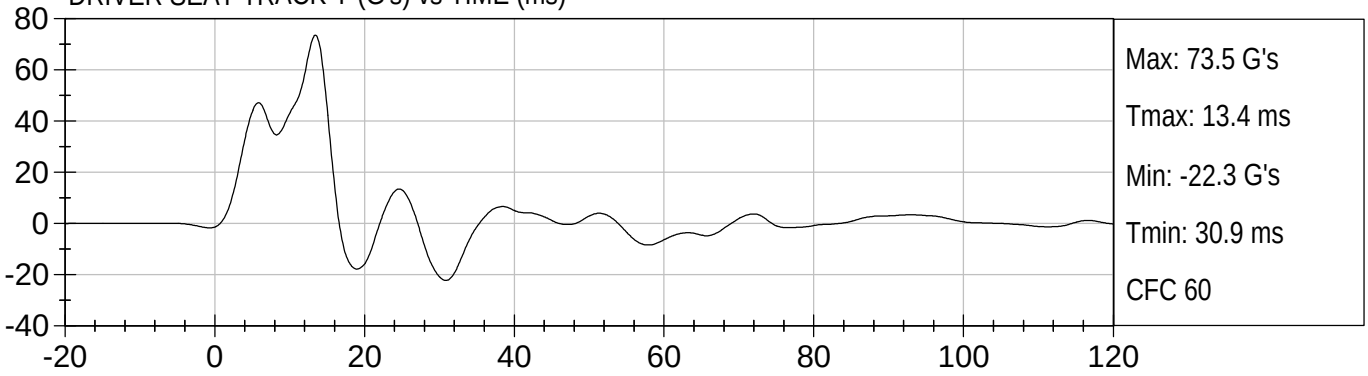




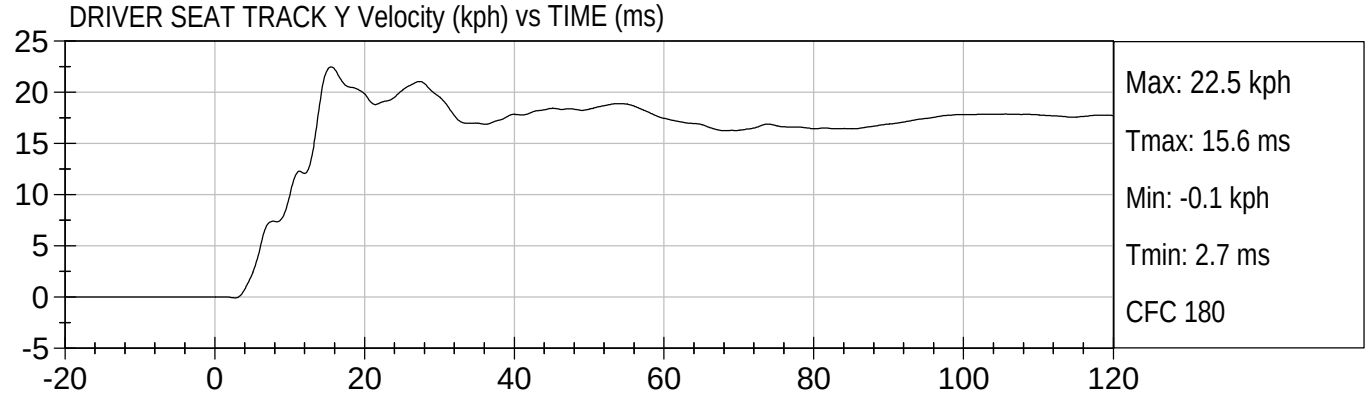
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

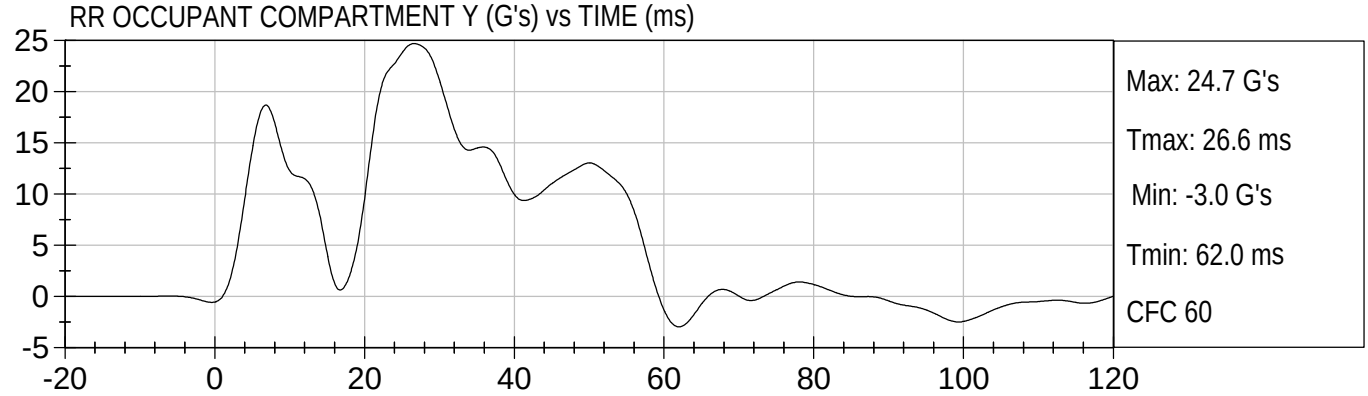
DRIVER SEAT TRACK Y (G's) vs TIME (ms)



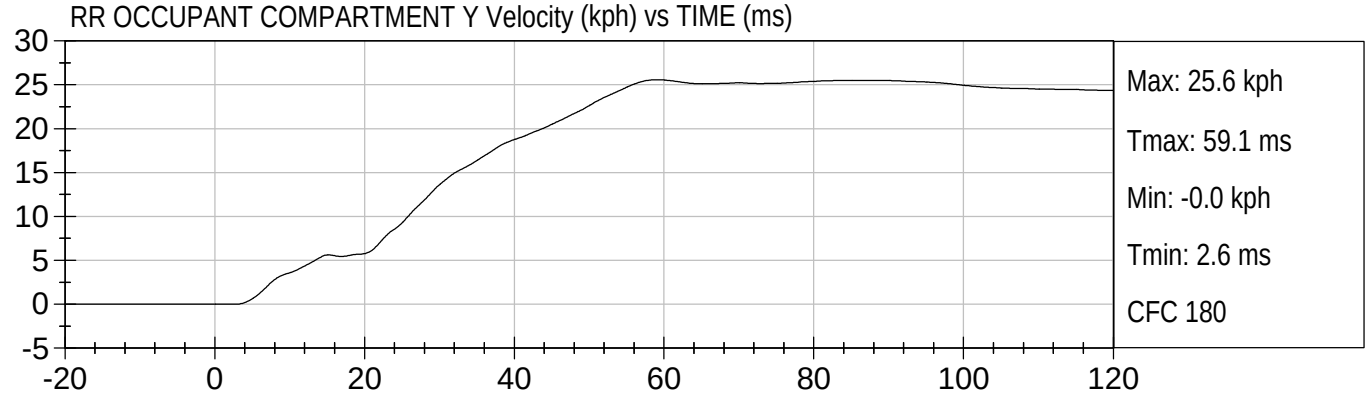
DRIVER SEAT TRACK Y Velocity (kph) vs TIME (ms)



RR OCCUPANT COMPARTMENT Y (G's) vs TIME (ms)



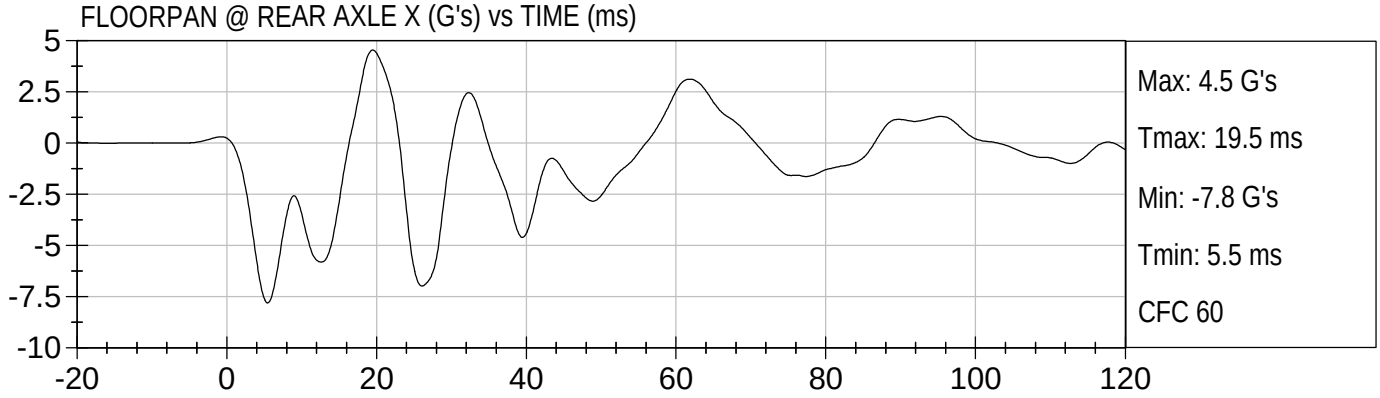
RR OCCUPANT COMPARTMENT Y Velocity (kph) vs TIME (ms)



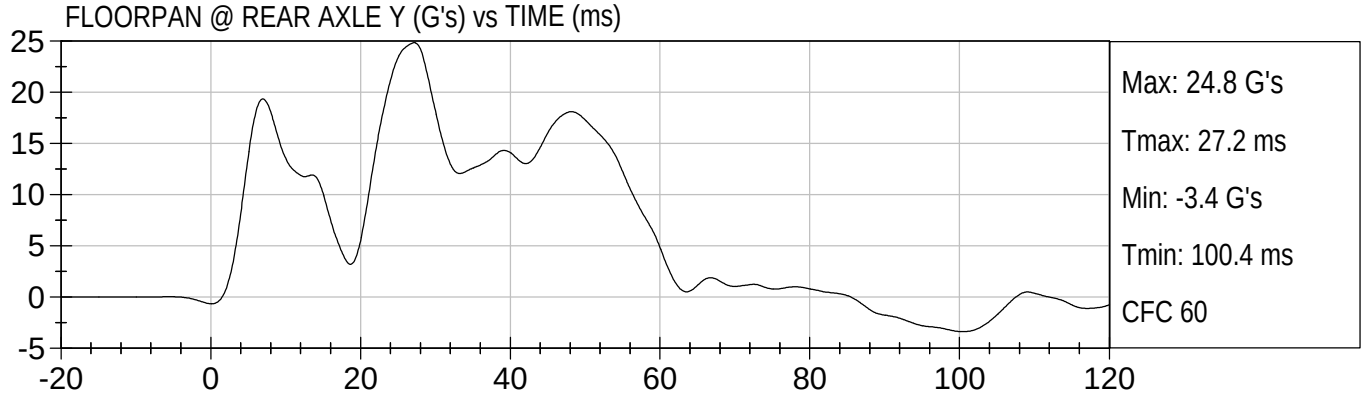
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

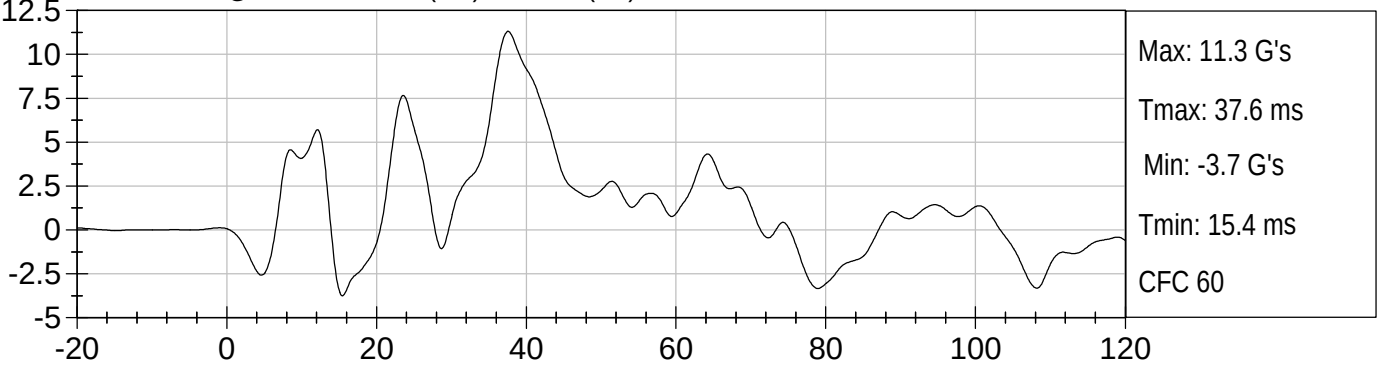
FLOORPAN @ REAR AXLE X (G's) vs TIME (ms)



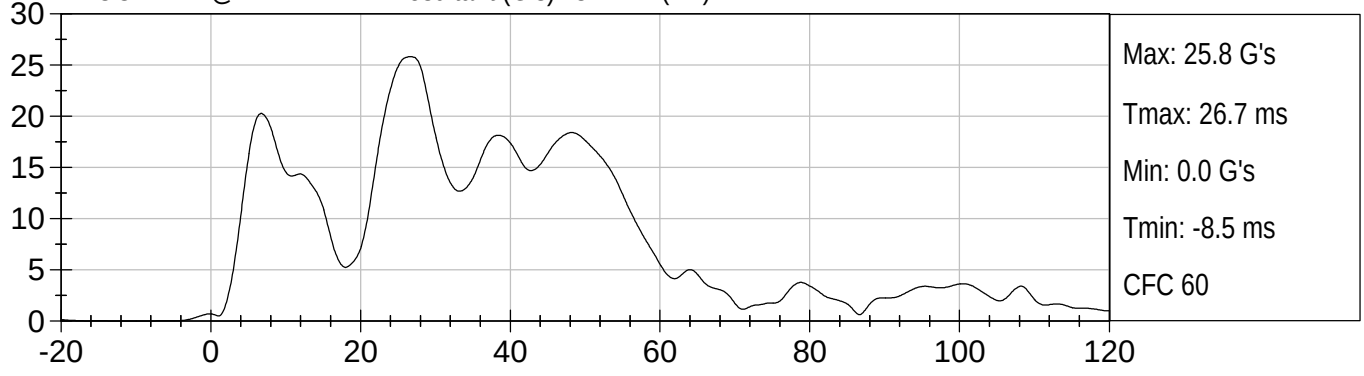
FLOORPAN @ REAR AXLE Y (G's) vs TIME (ms)



FLOORPAN @ REAR AXLE Z (G's) vs TIME (ms)

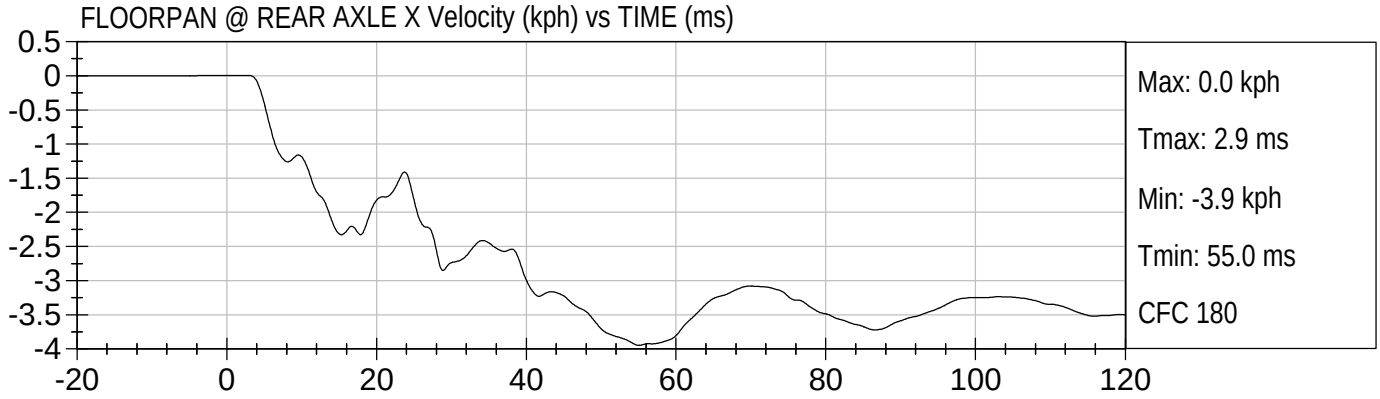


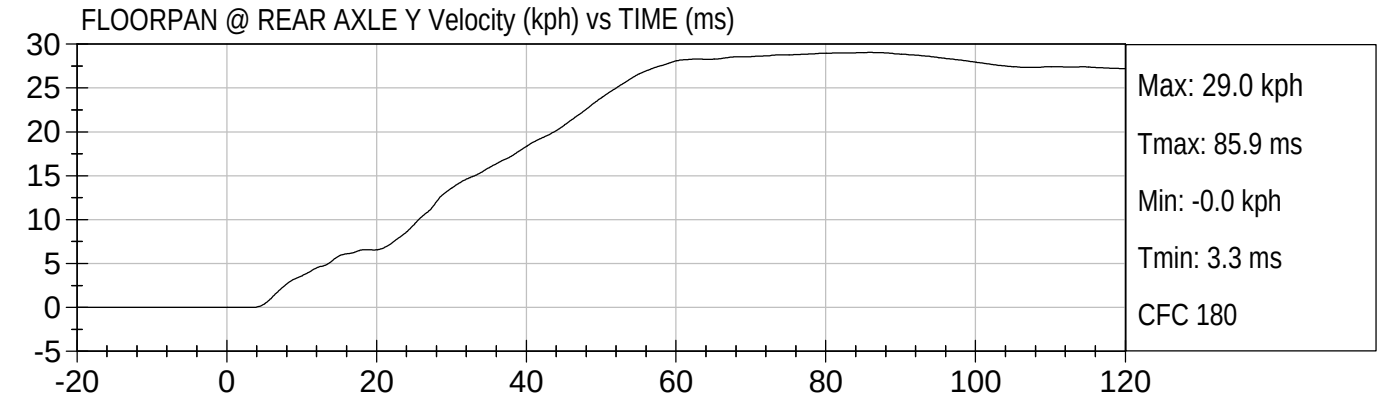
FLOORPAN @ REAR AXLE Resultant (G's) vs TIME (ms)

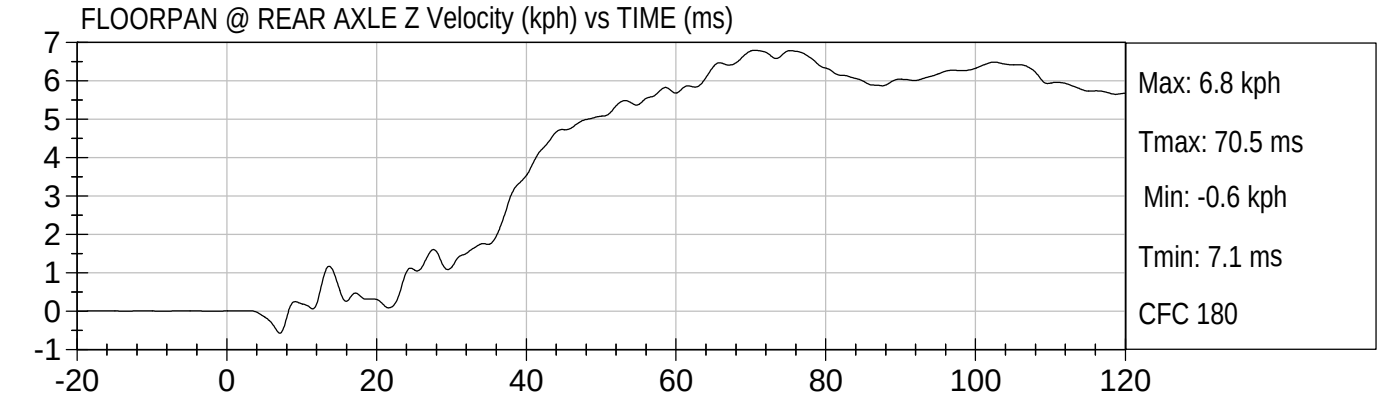


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

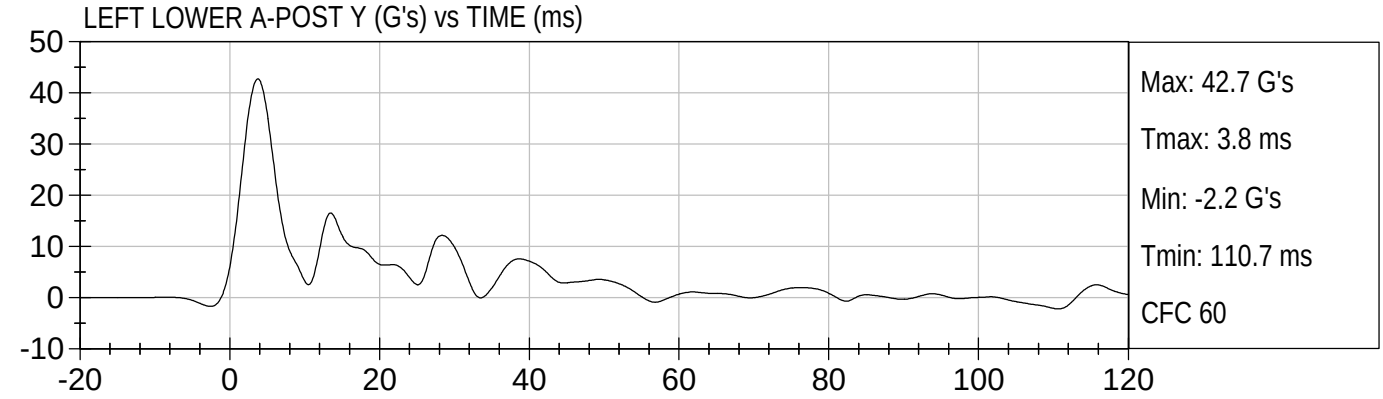


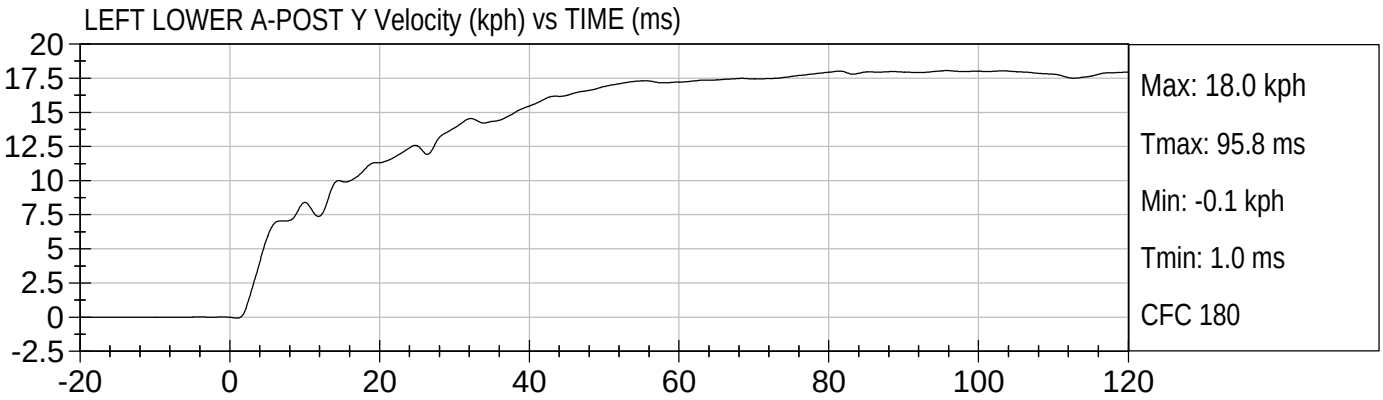


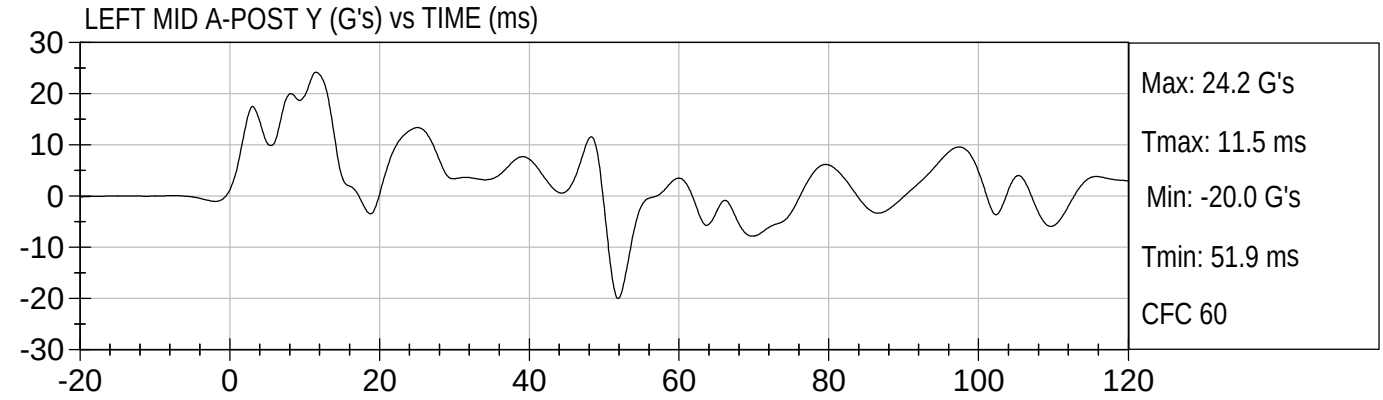


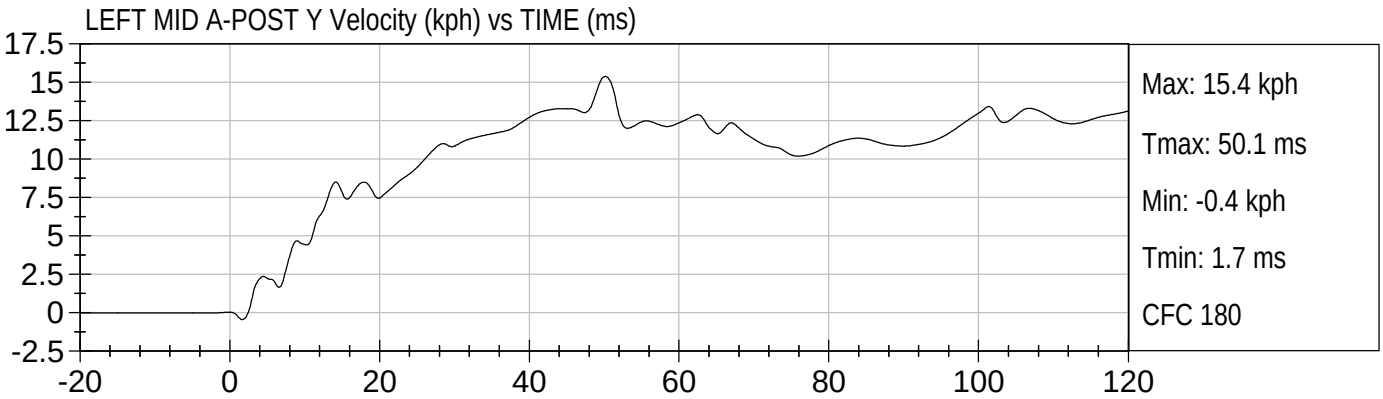
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



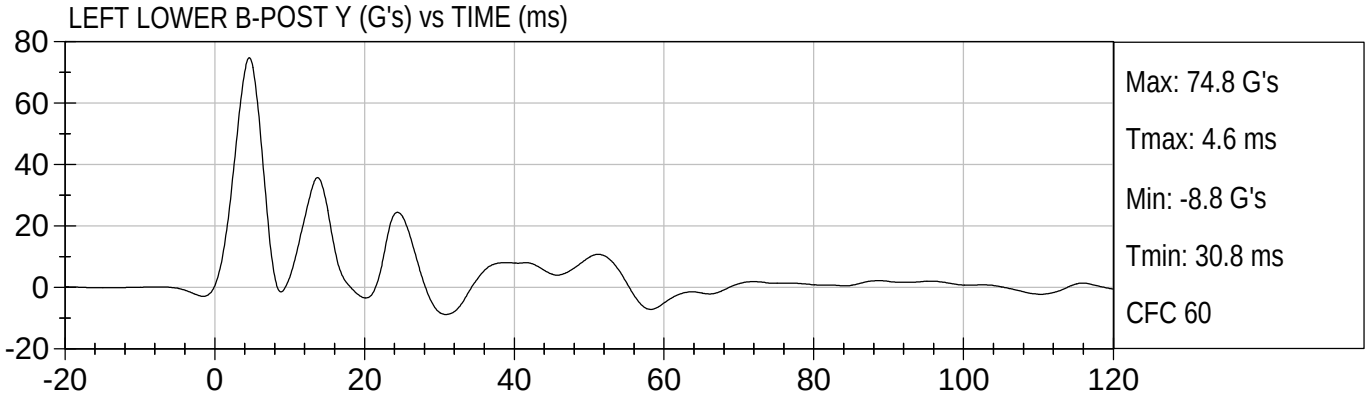


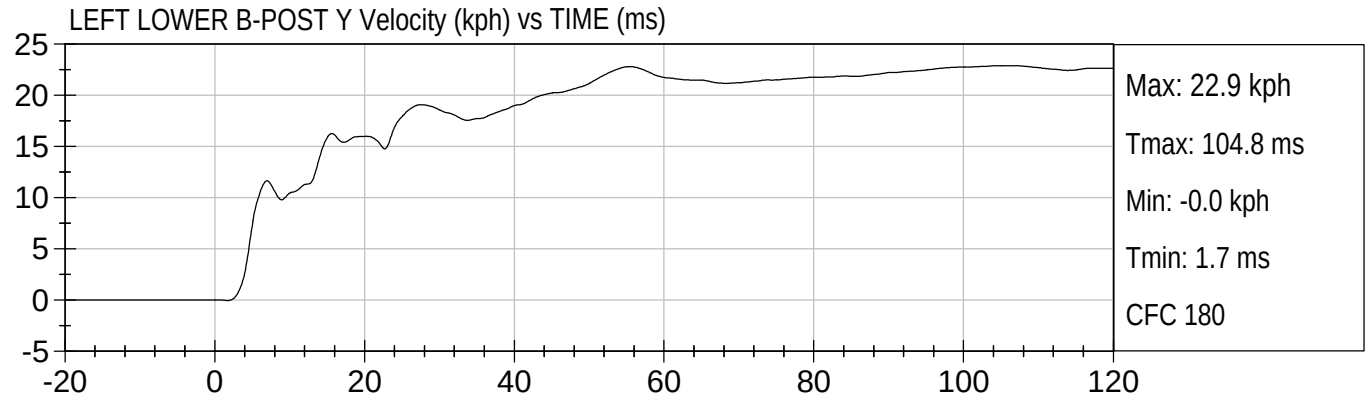




90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

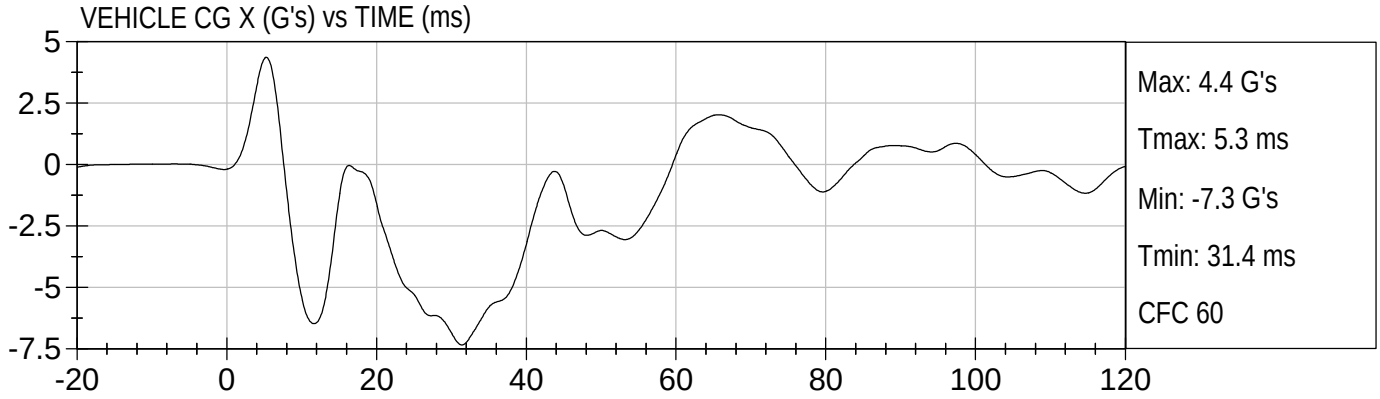
Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

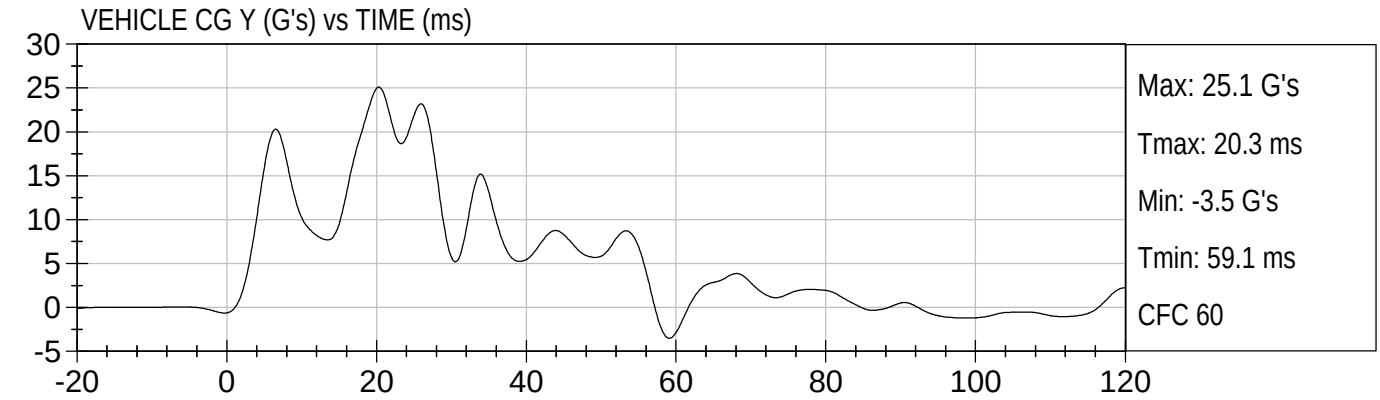


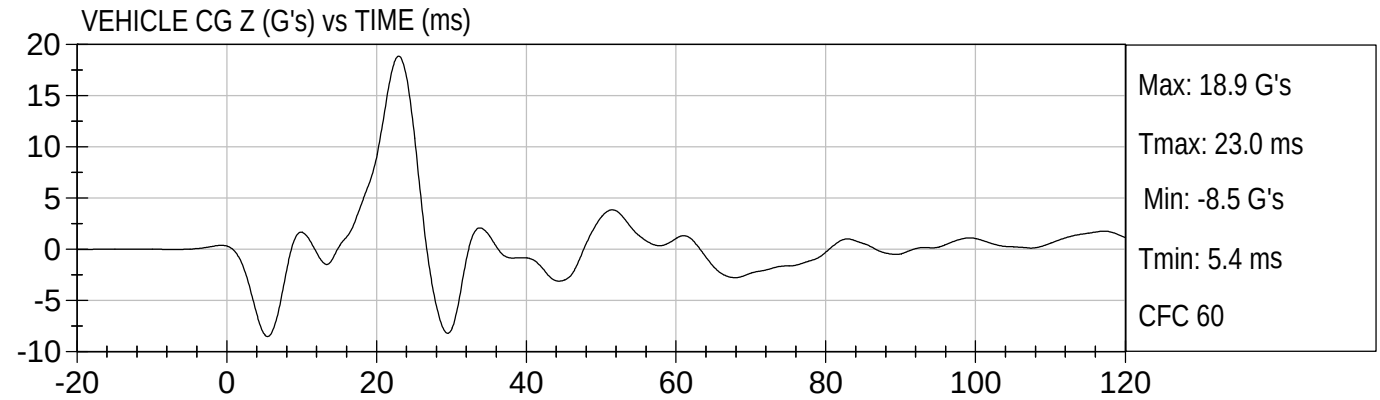


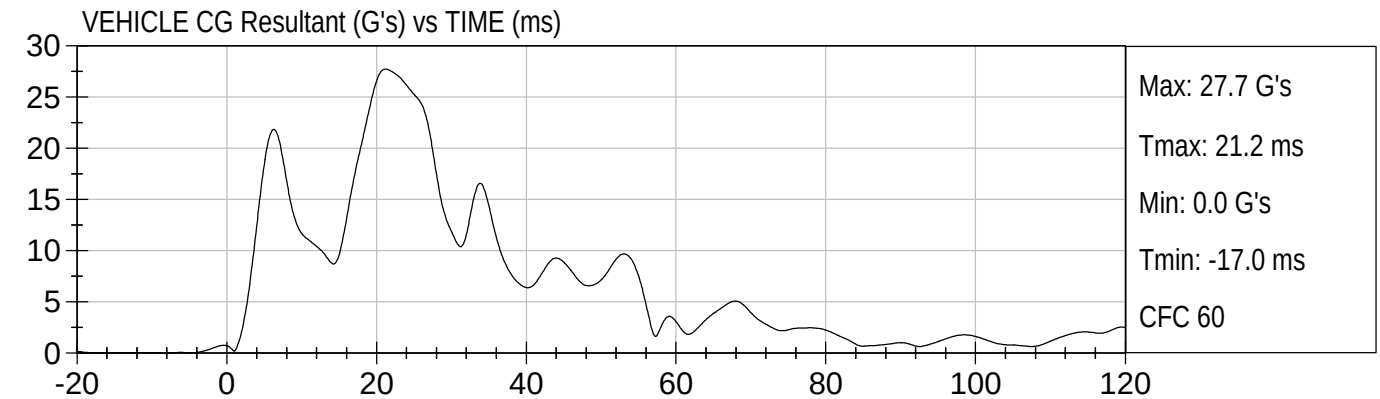
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



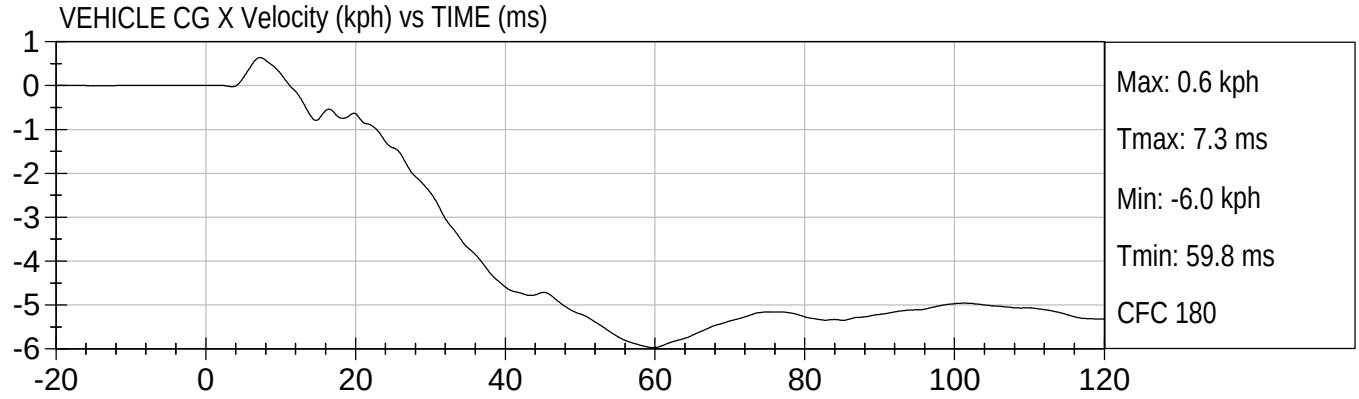


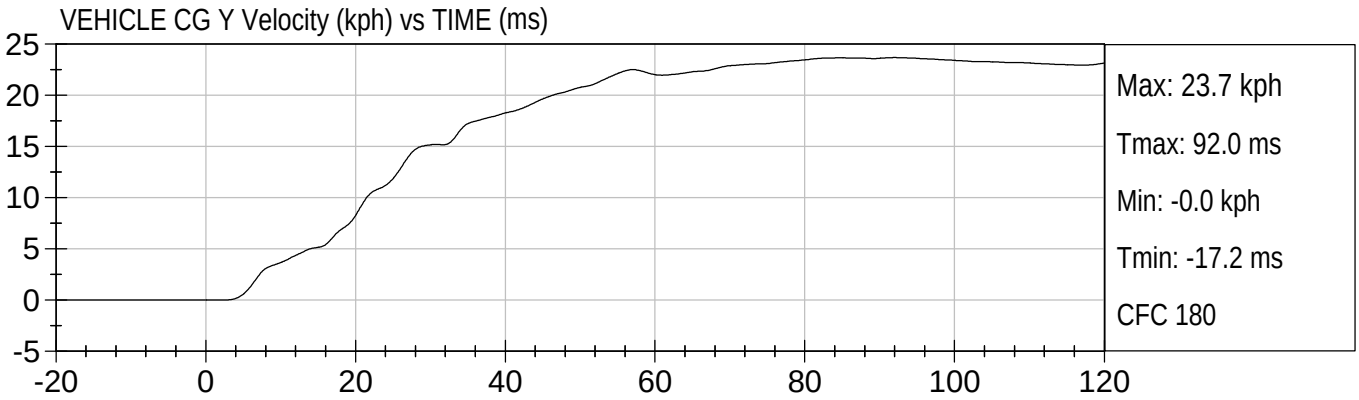


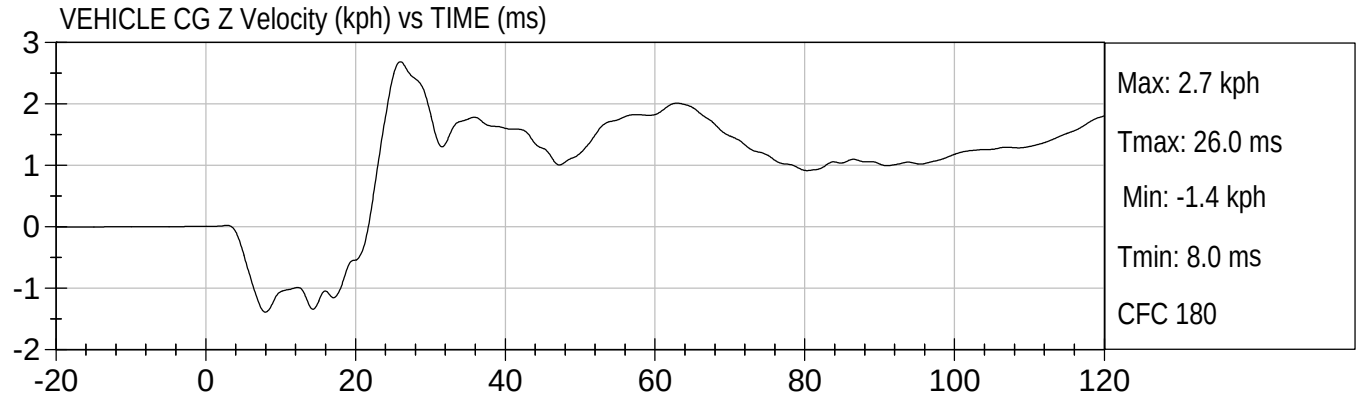


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

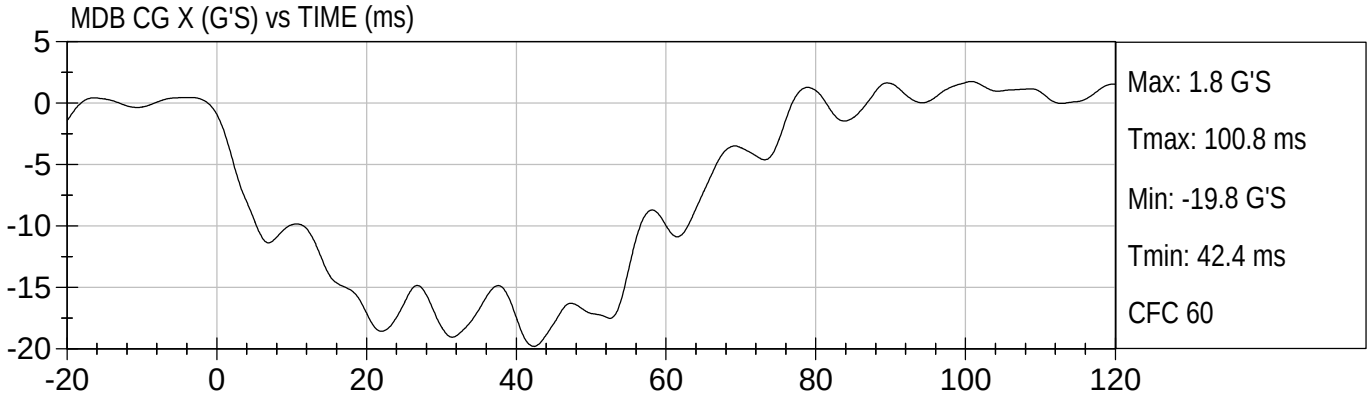


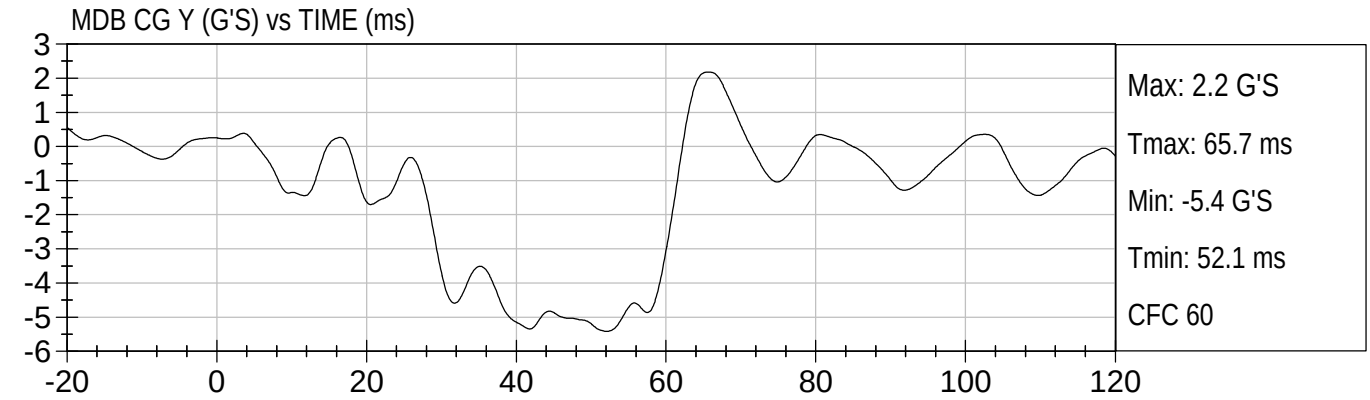


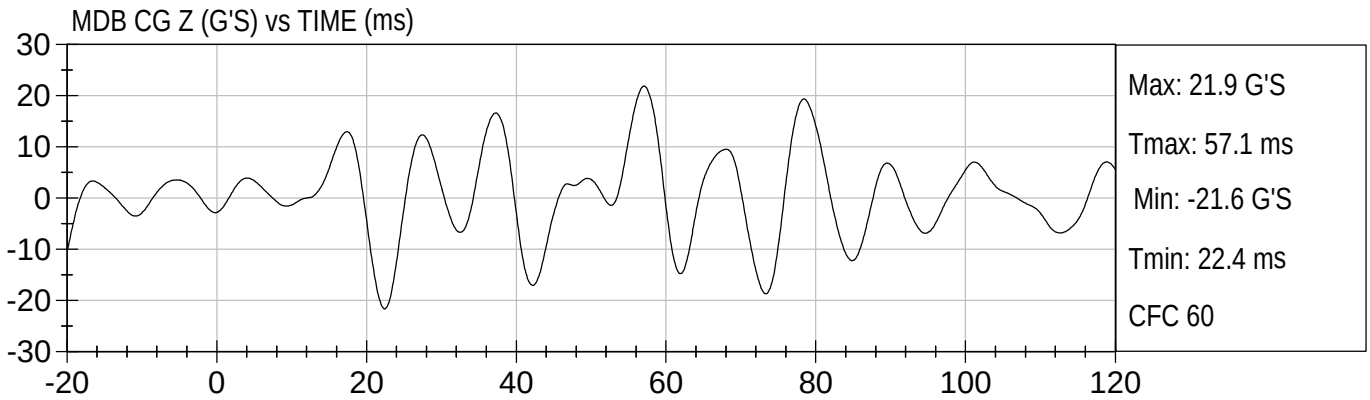


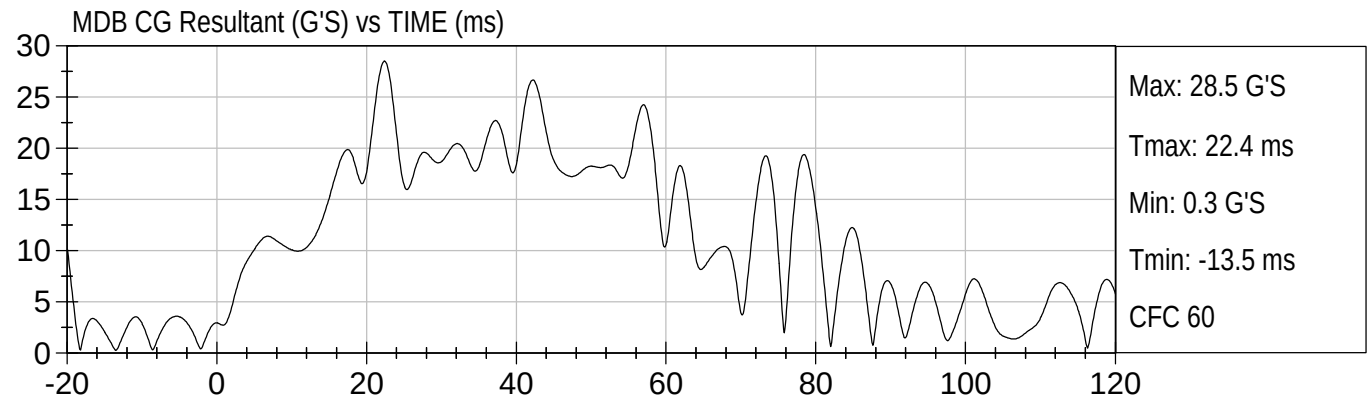
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



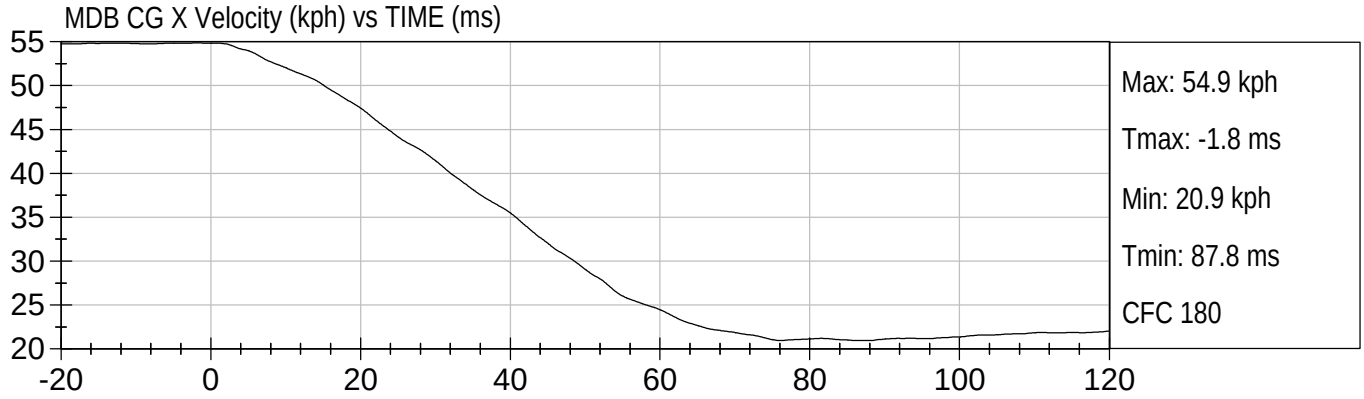


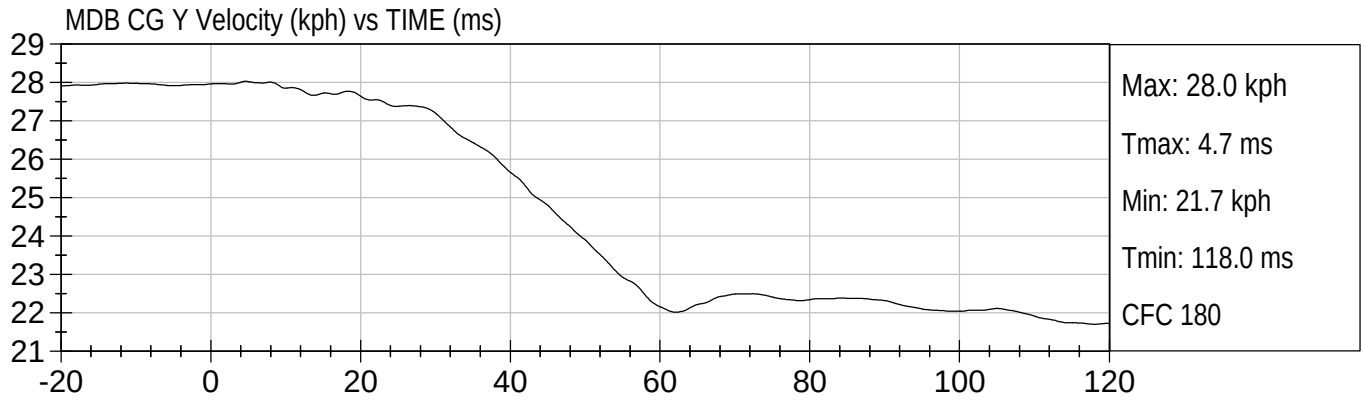


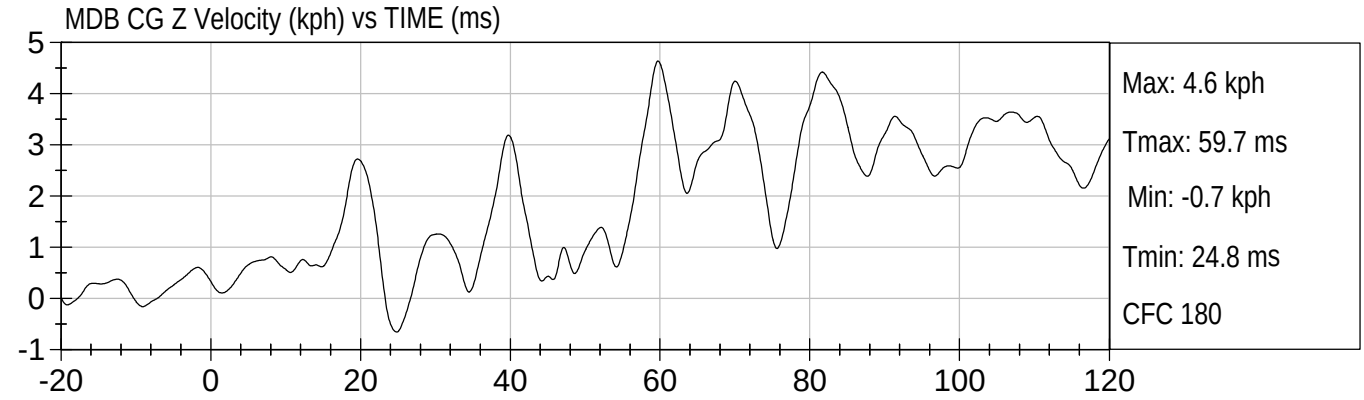


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

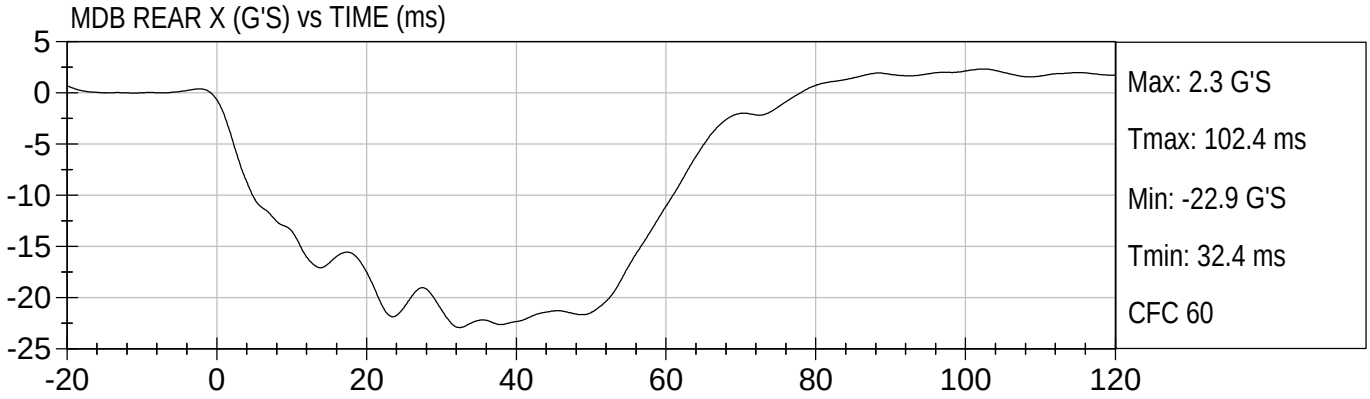


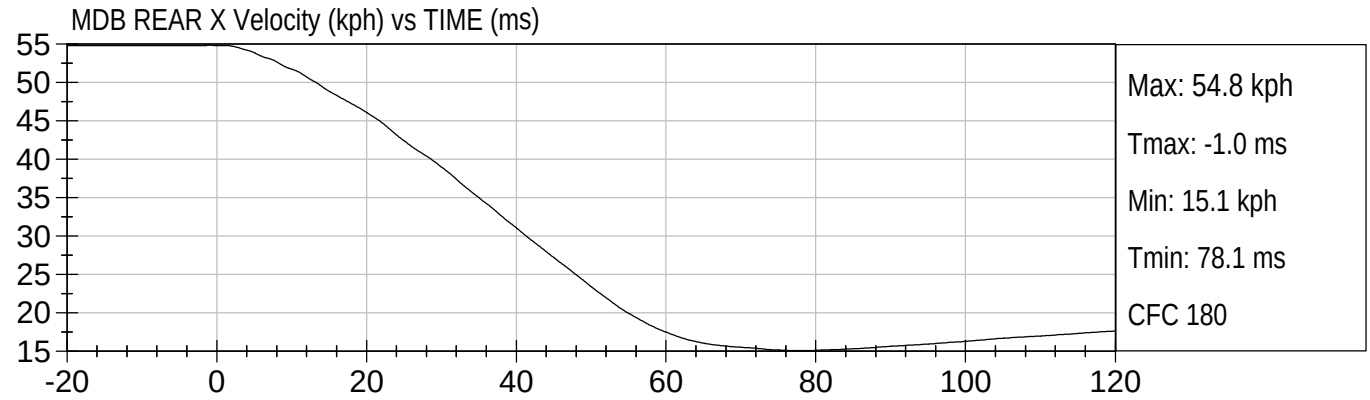


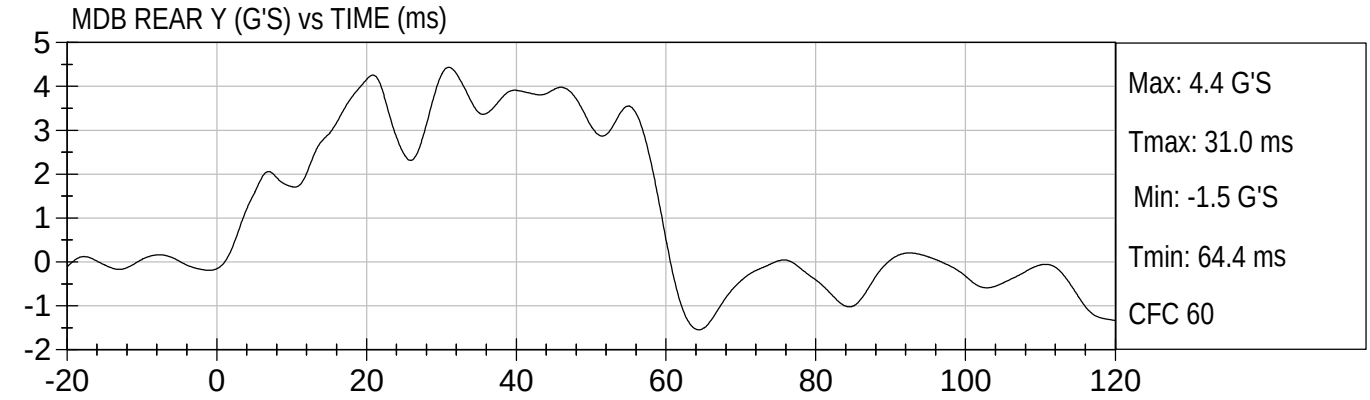


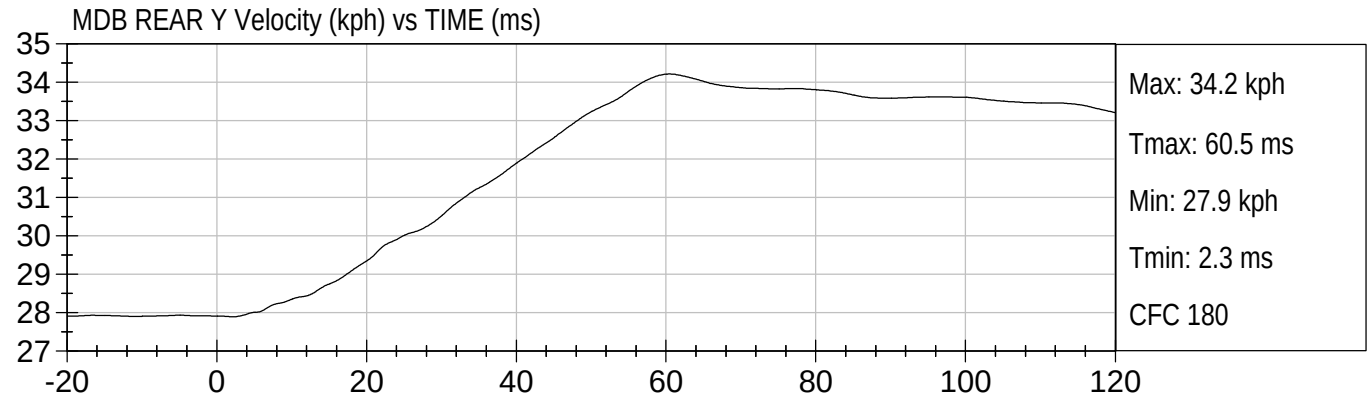
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



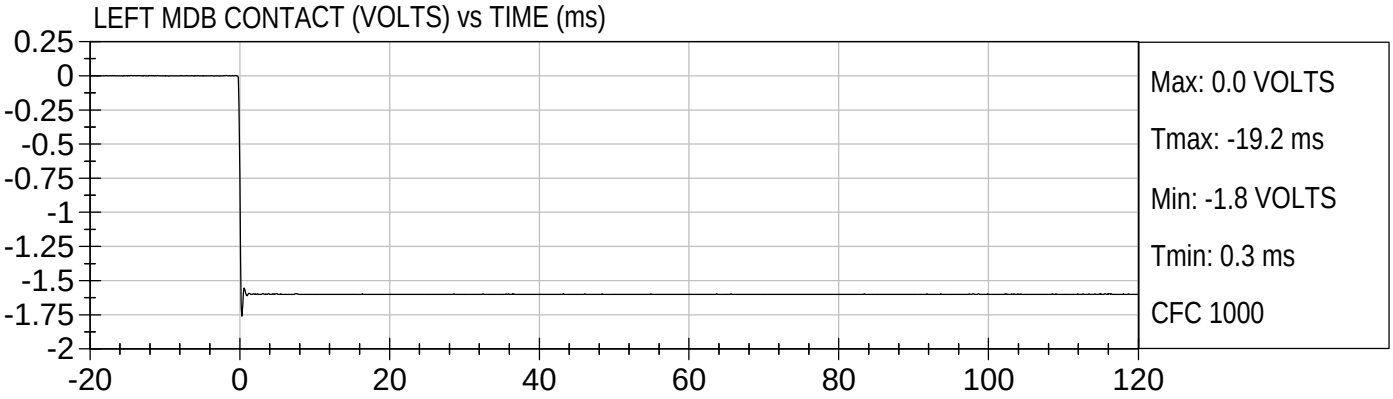


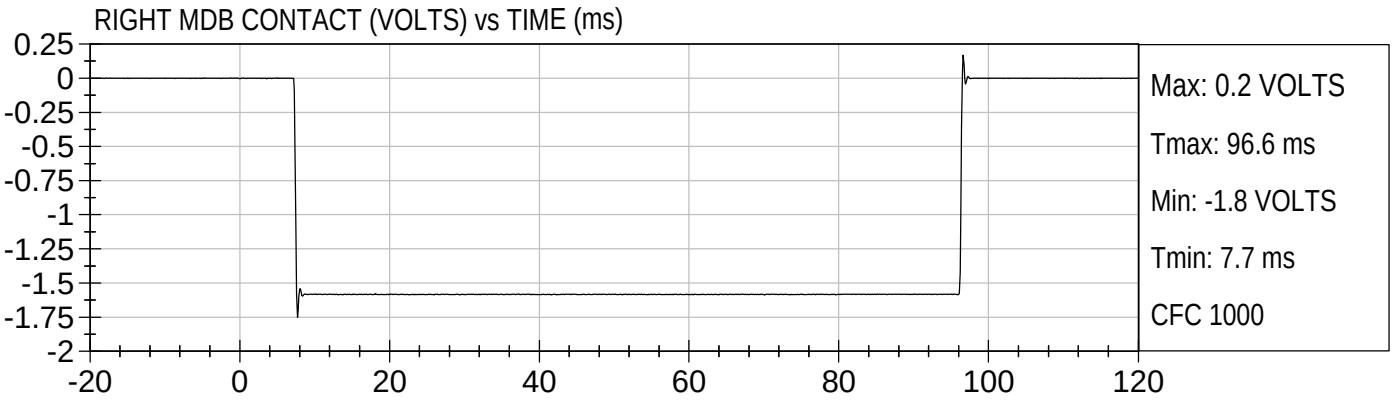




90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

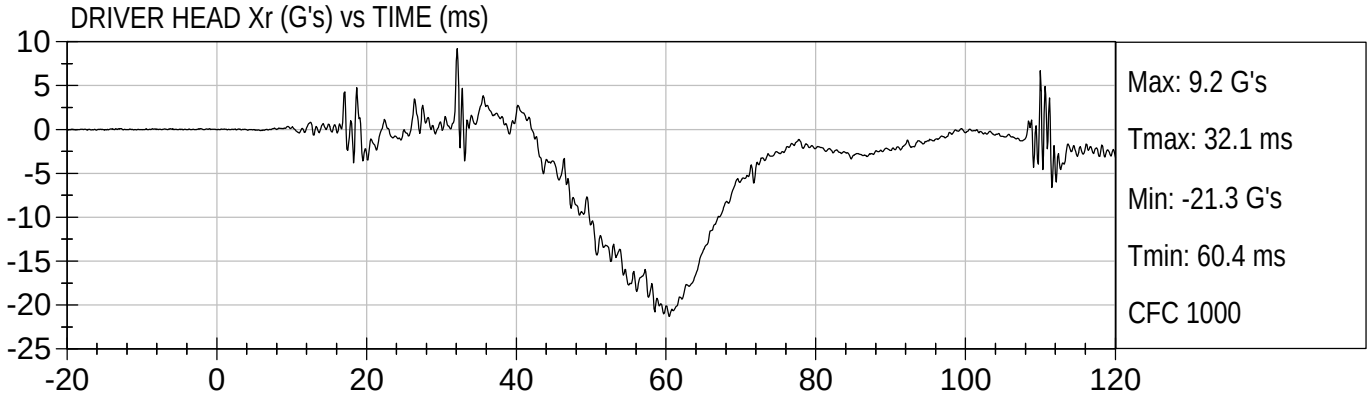
Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

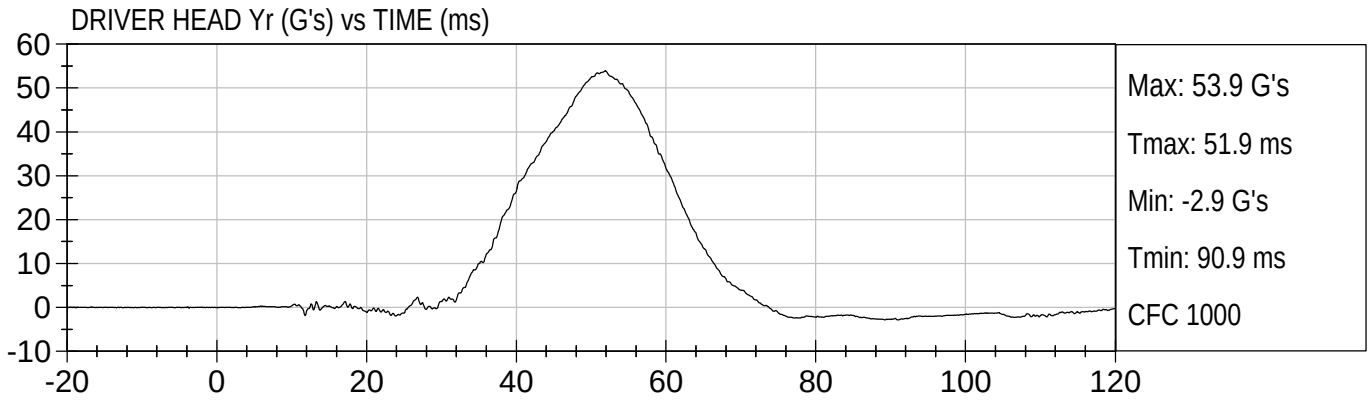


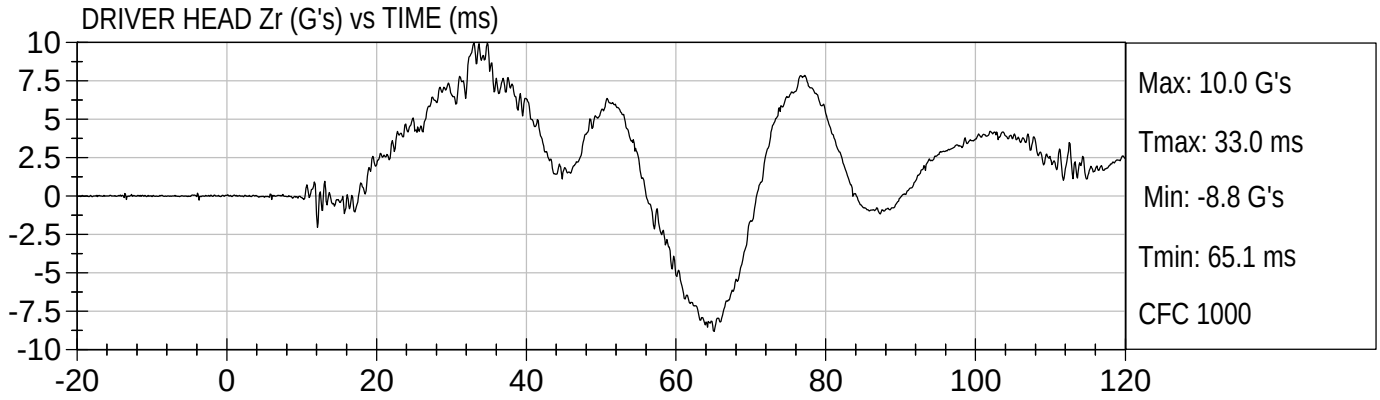


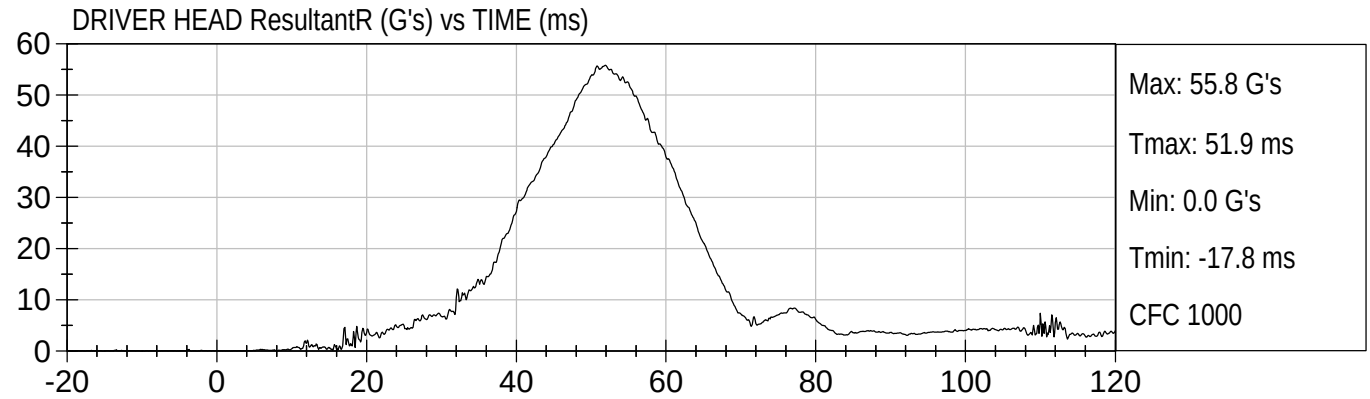
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



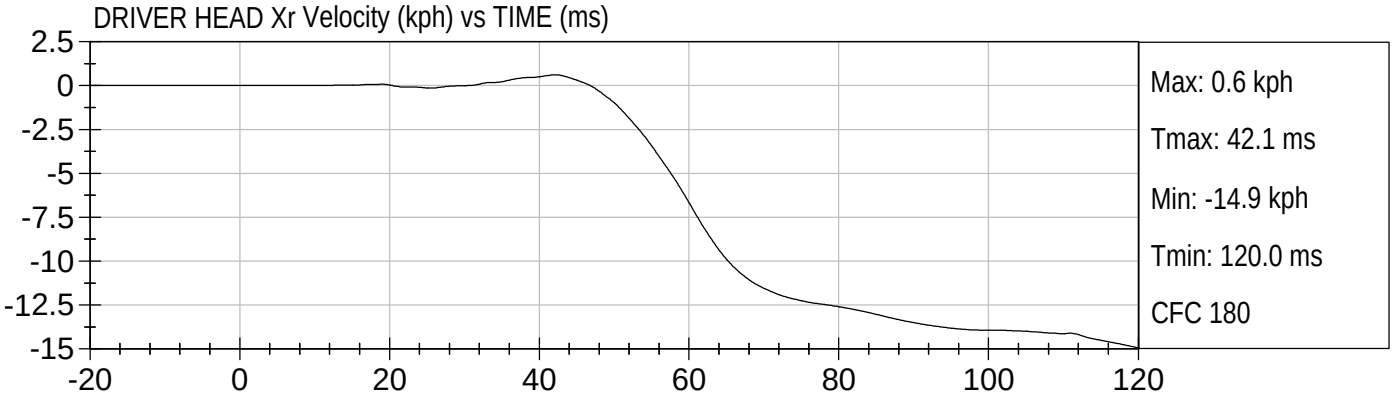


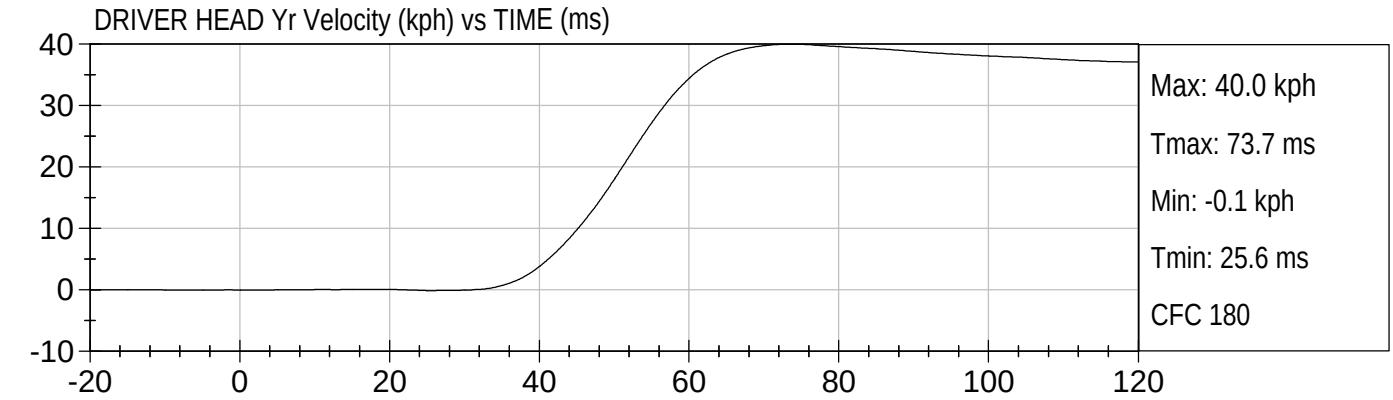


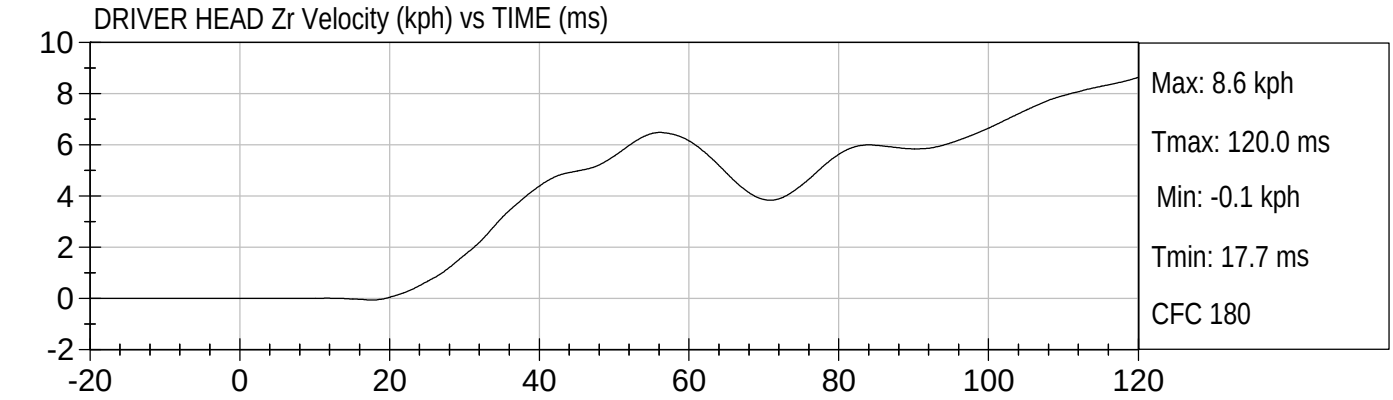


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



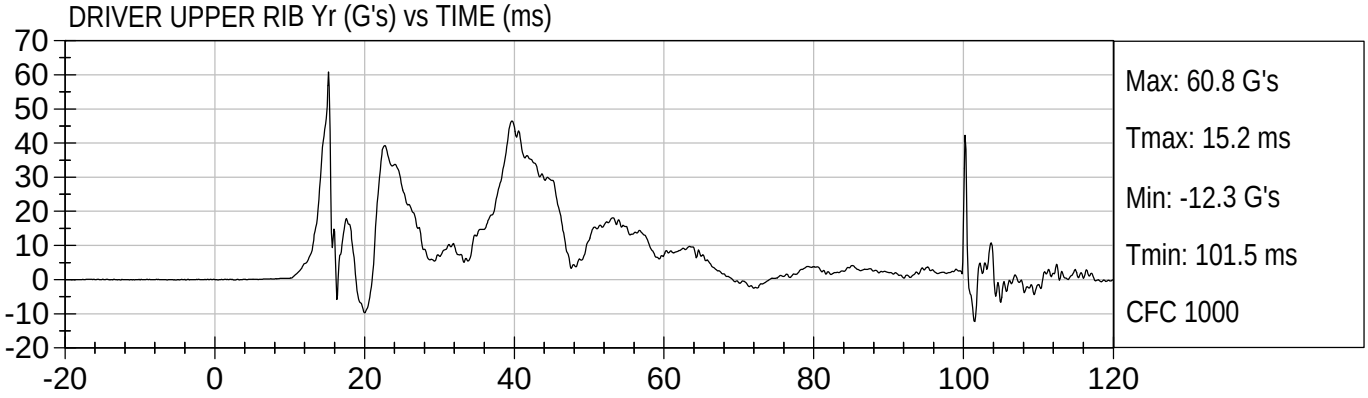




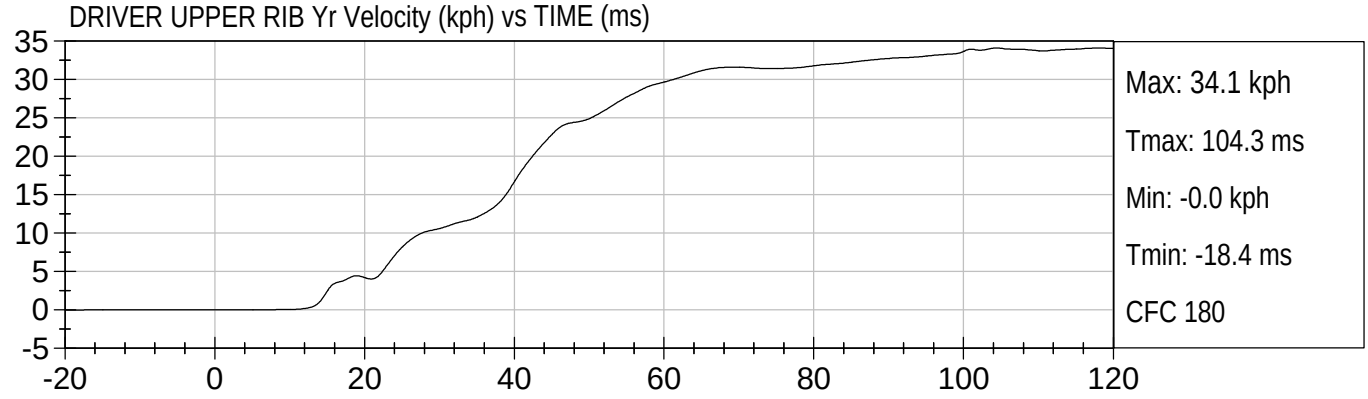
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

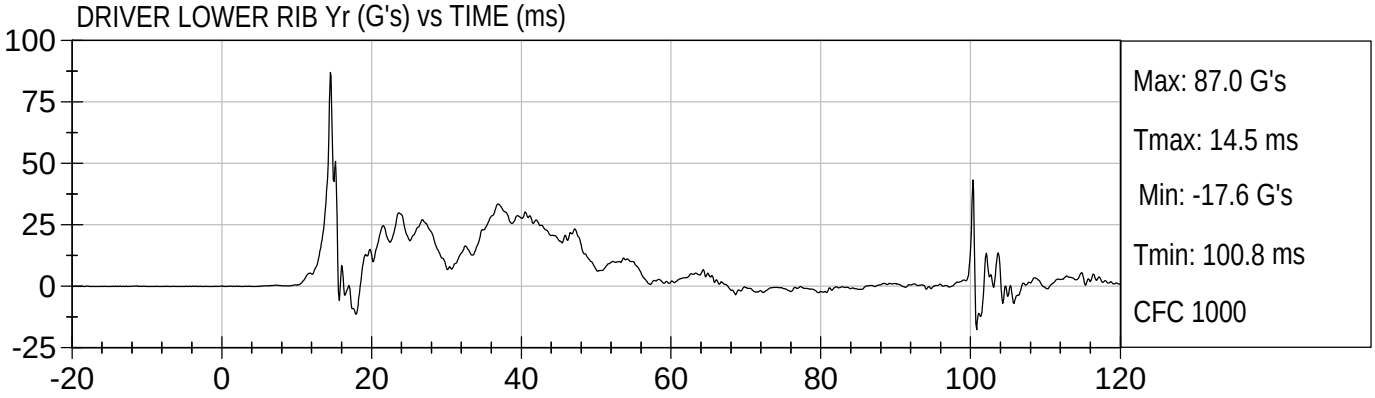
DRIVER UPPER RIB Yr (G's) vs TIME (ms)



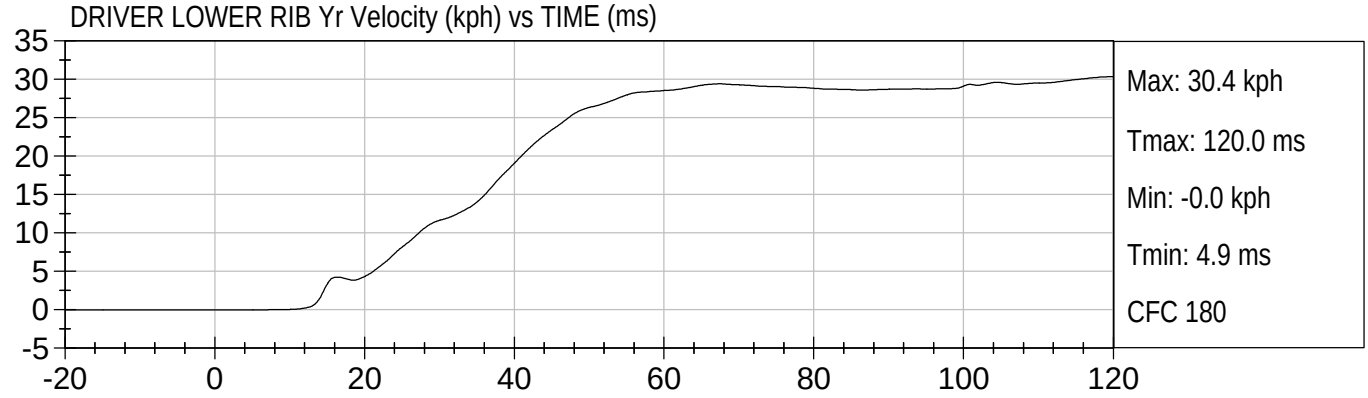
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Yr (G's) vs TIME (ms)



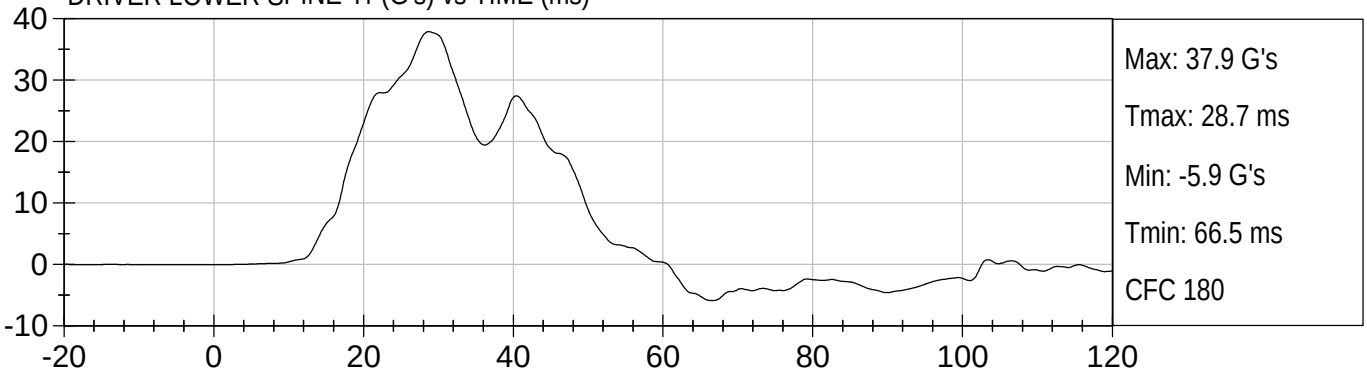
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



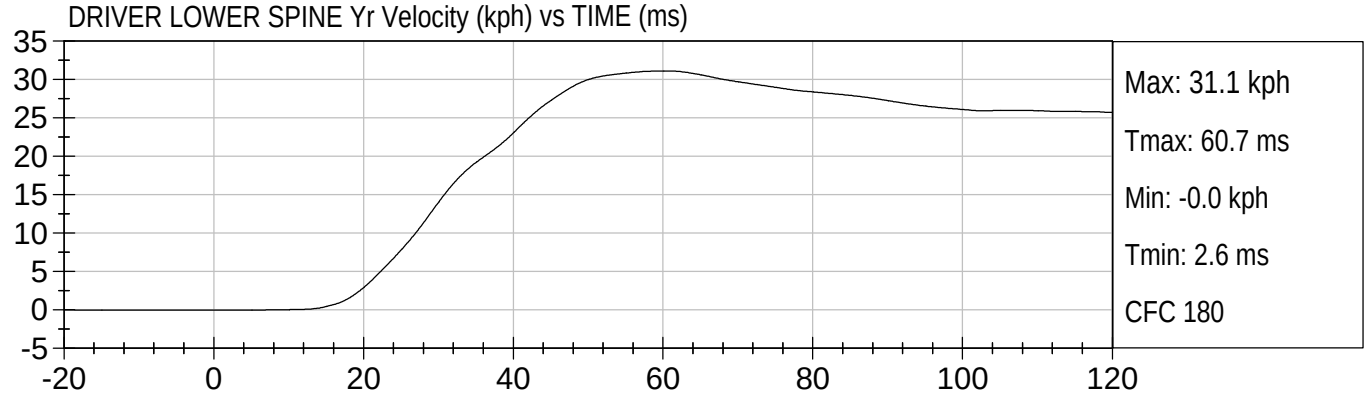
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

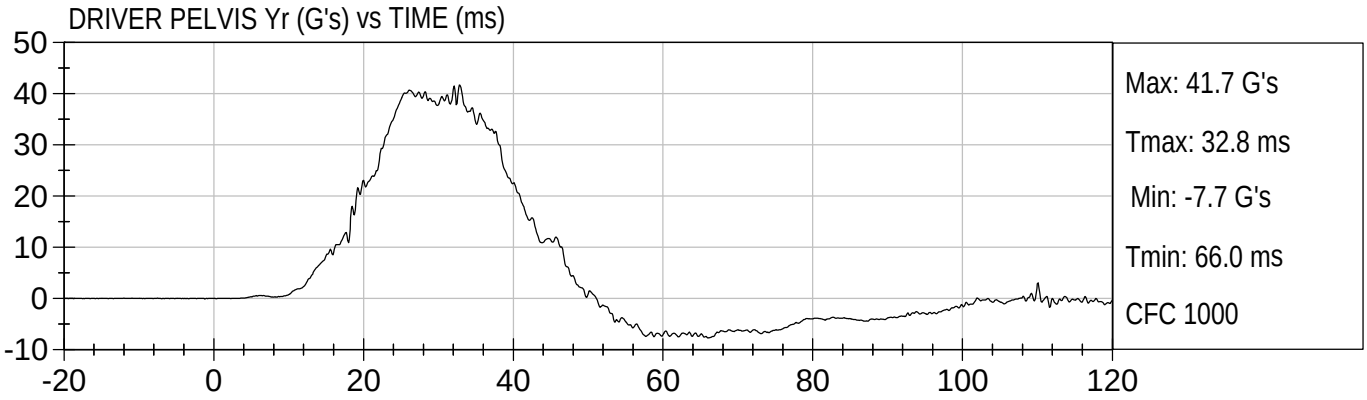
DRIVER LOWER SPINE Yr (G's) vs TIME (ms)



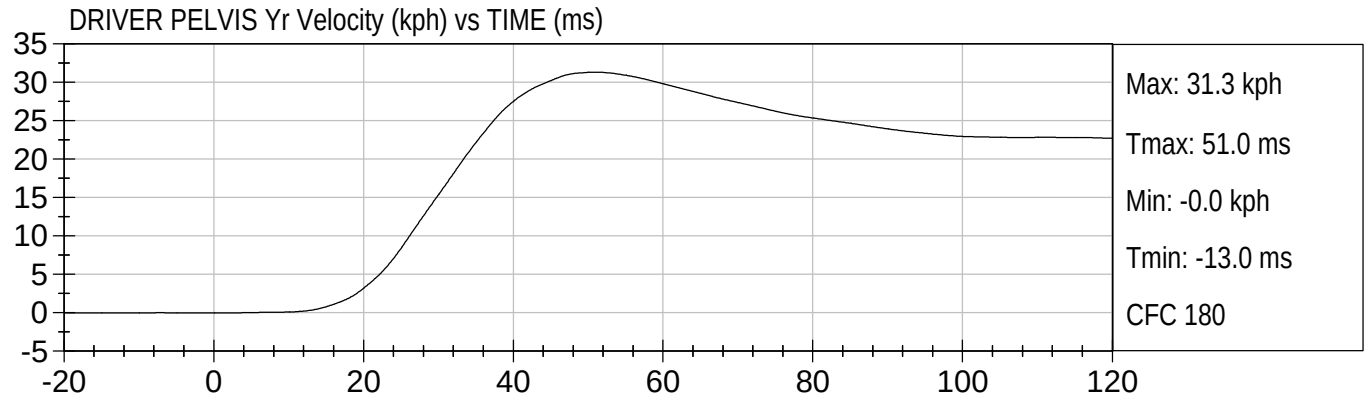
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



DRIVER PELVIS Yr (G's) vs TIME (ms)

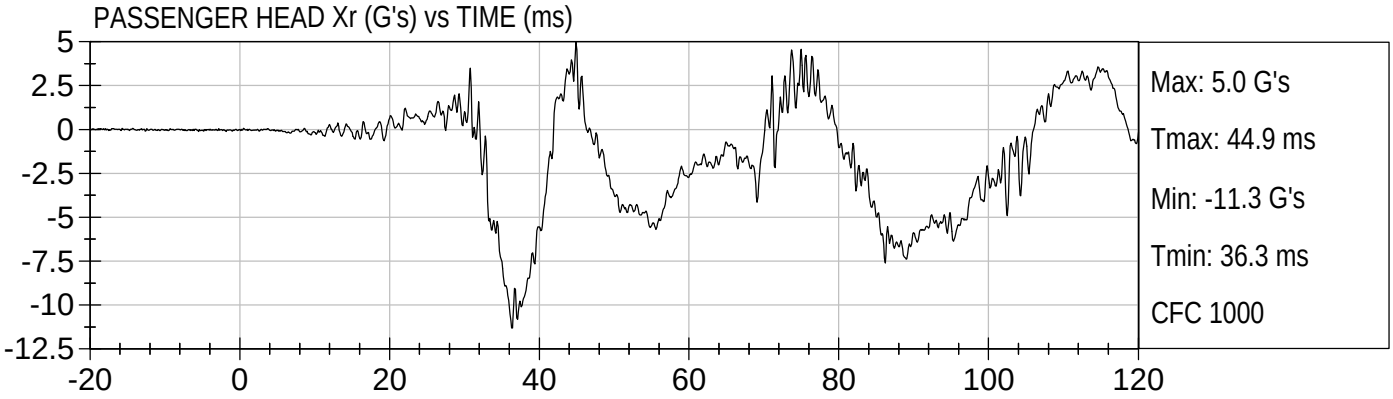


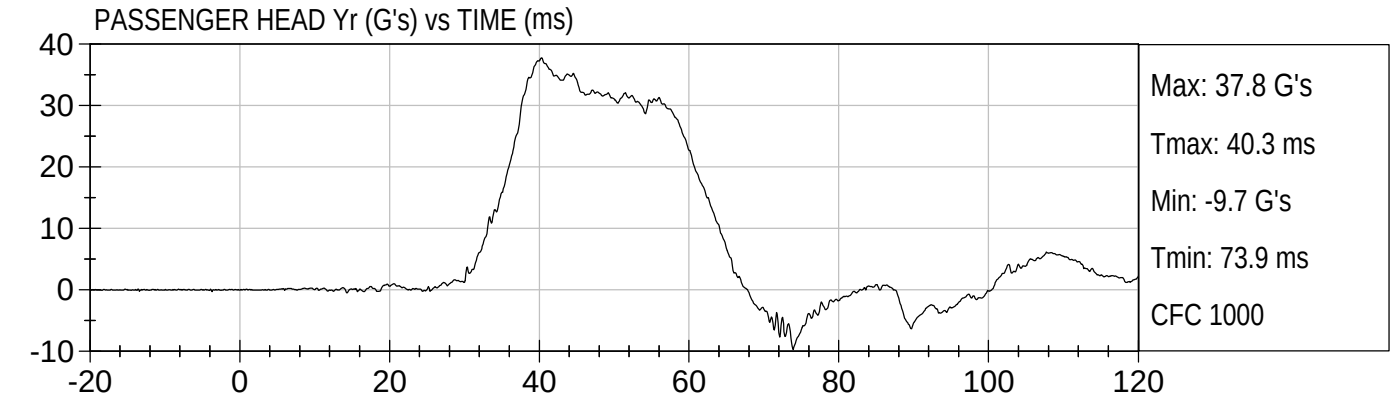
DRIVER PELVIS Yr Velocity (kph) vs TIME (ms)

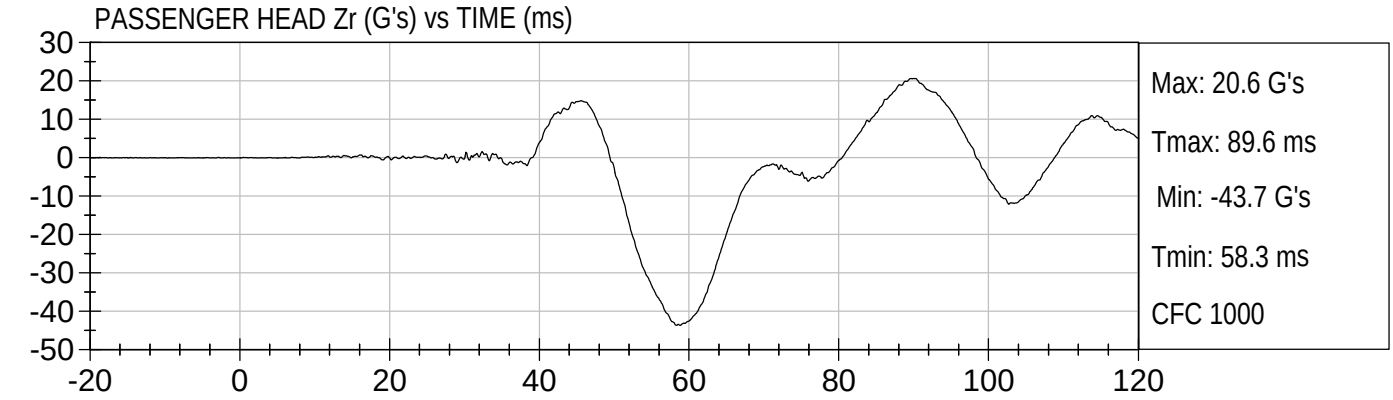


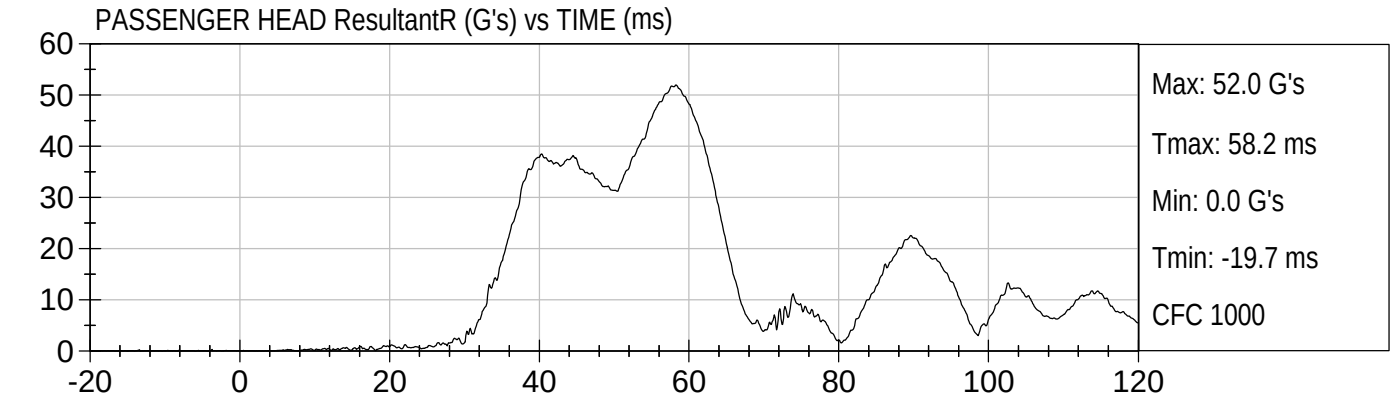
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



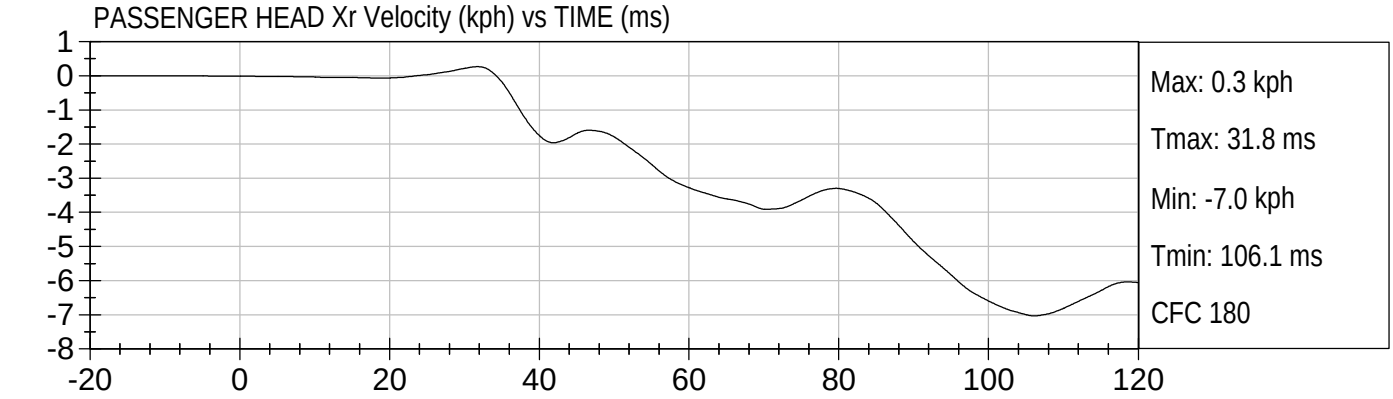


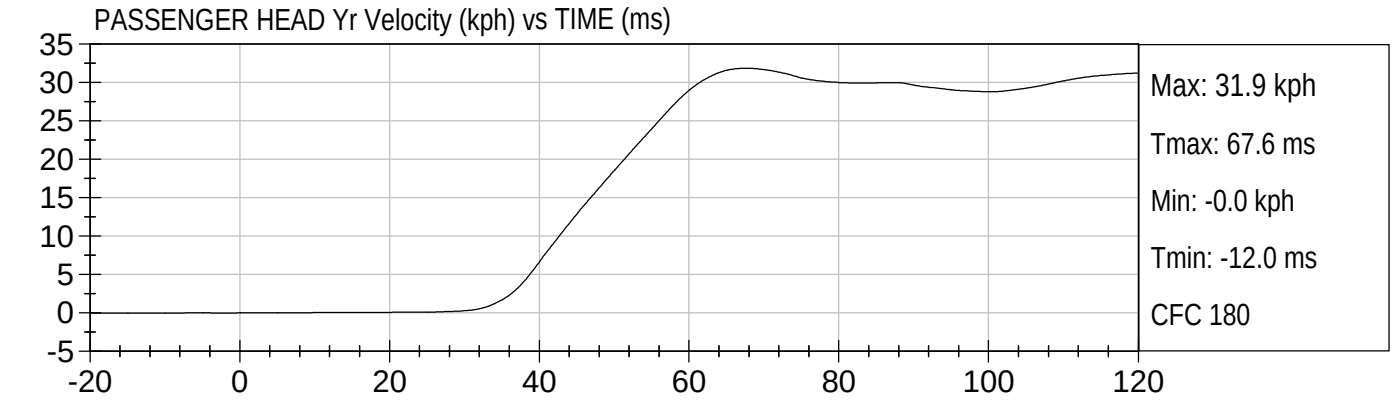


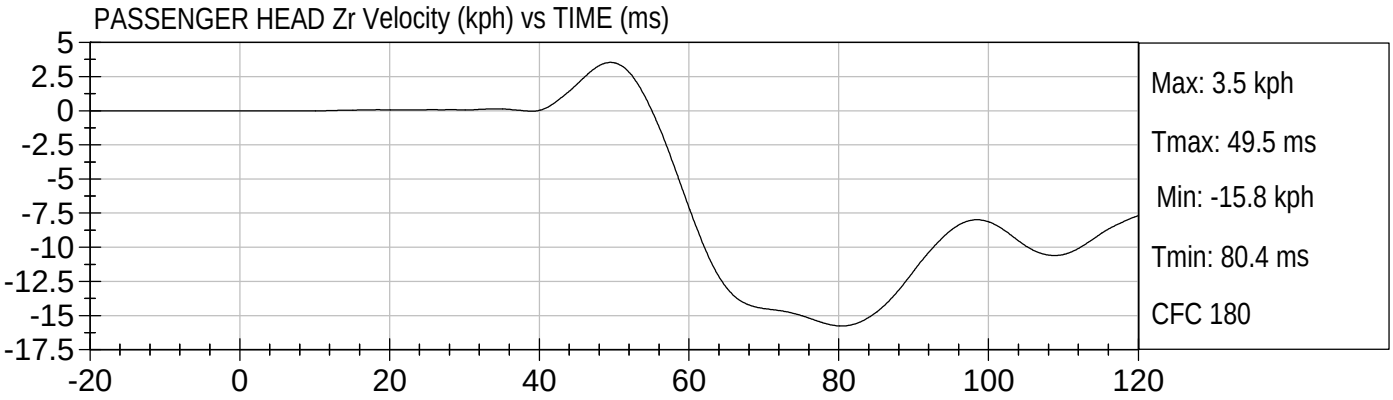


90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)



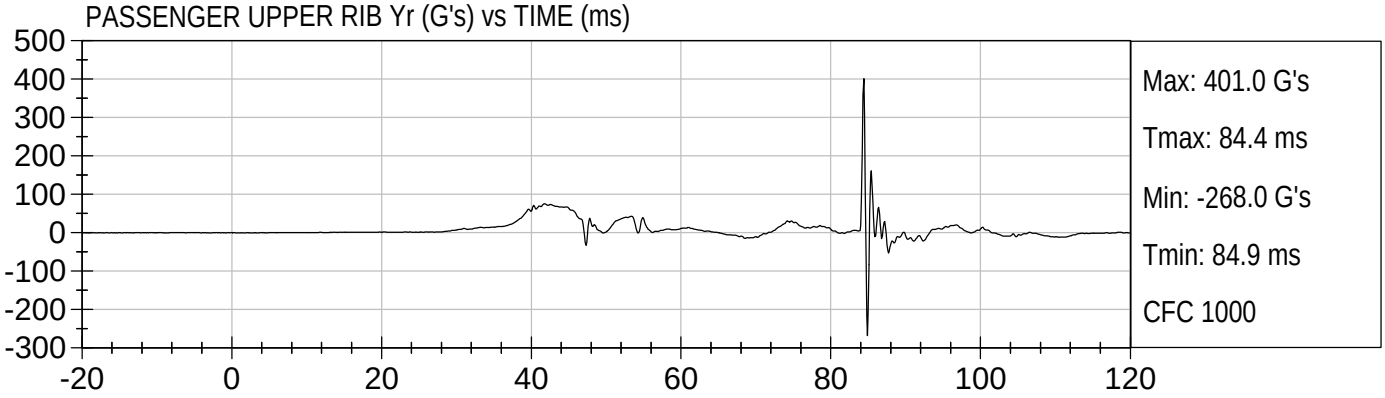




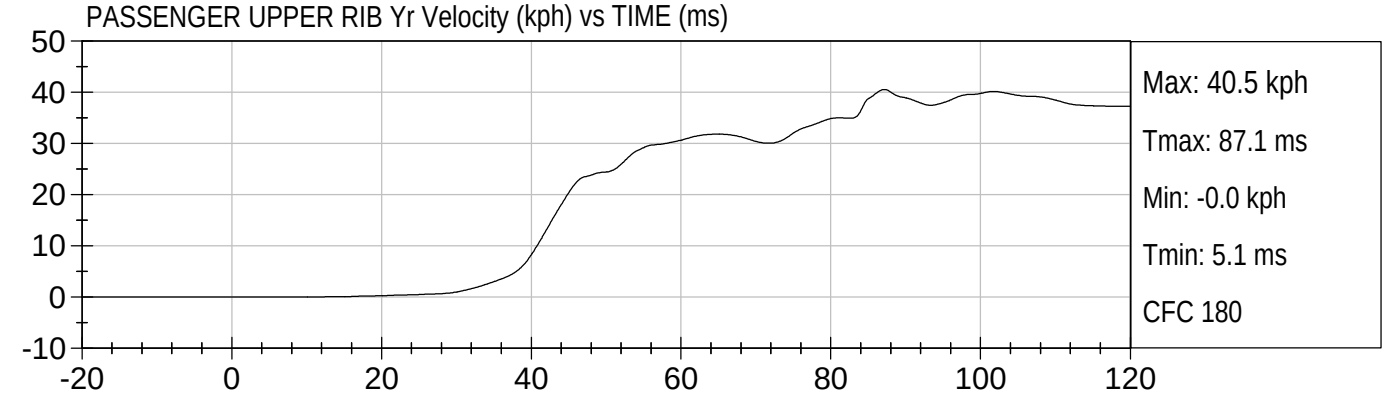
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

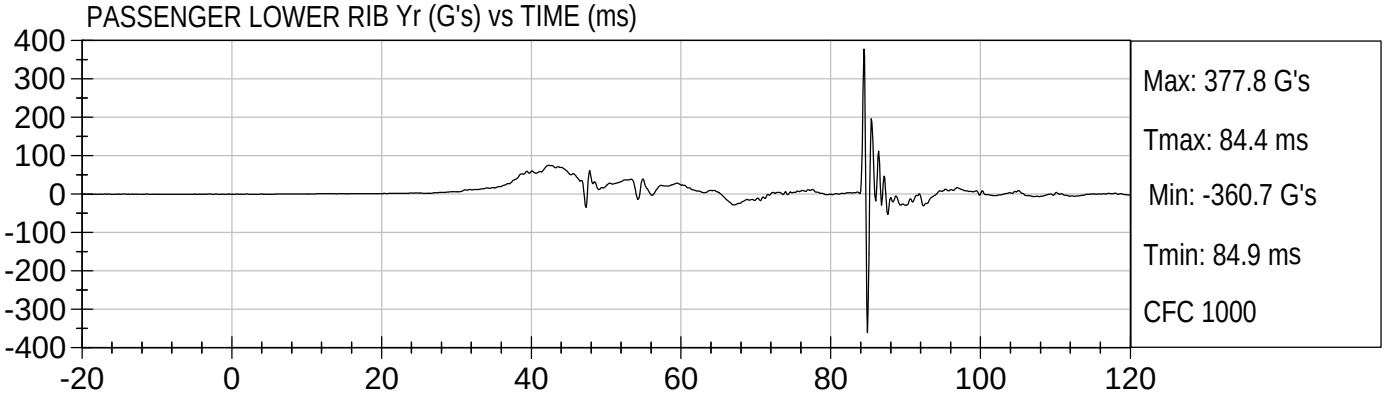
PASSENGER UPPER RIB Yr (G's) vs TIME (ms)



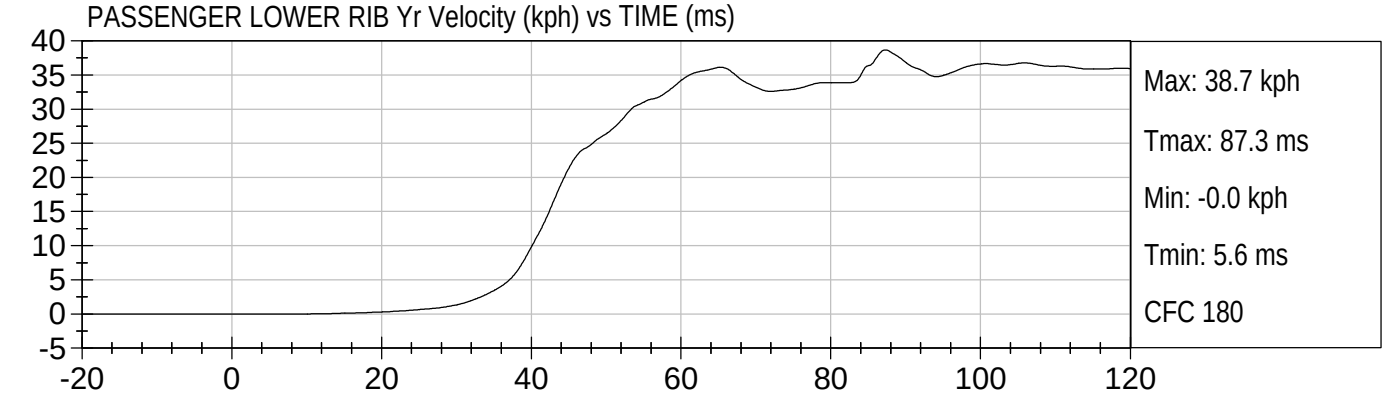
PASSENGER UPPER RIB Yr Velocity (kph) vs TIME (ms)



PASSENGER LOWER RIB Yr (G's) vs TIME (ms)



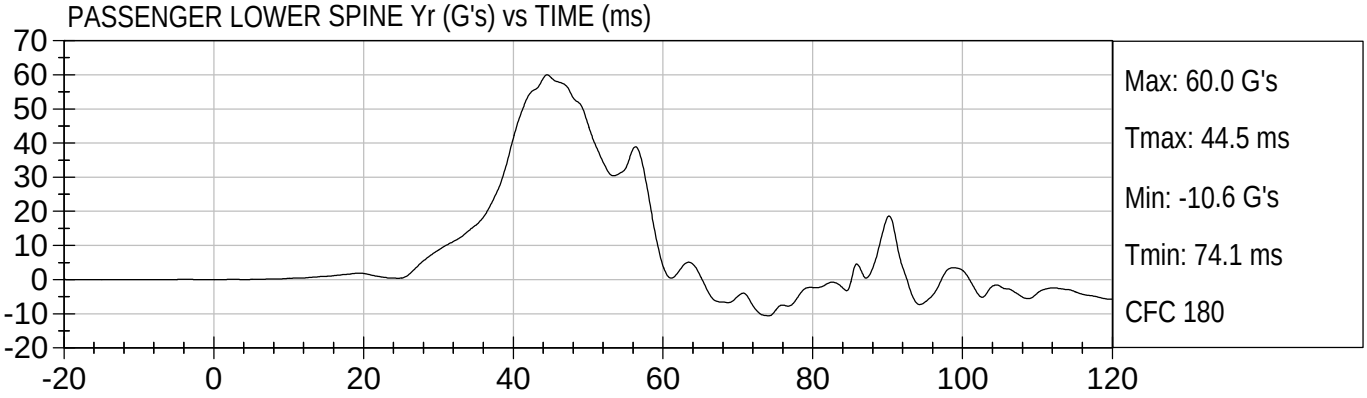
PASSENGER LOWER RIB Yr Velocity (kph) vs TIME (ms)



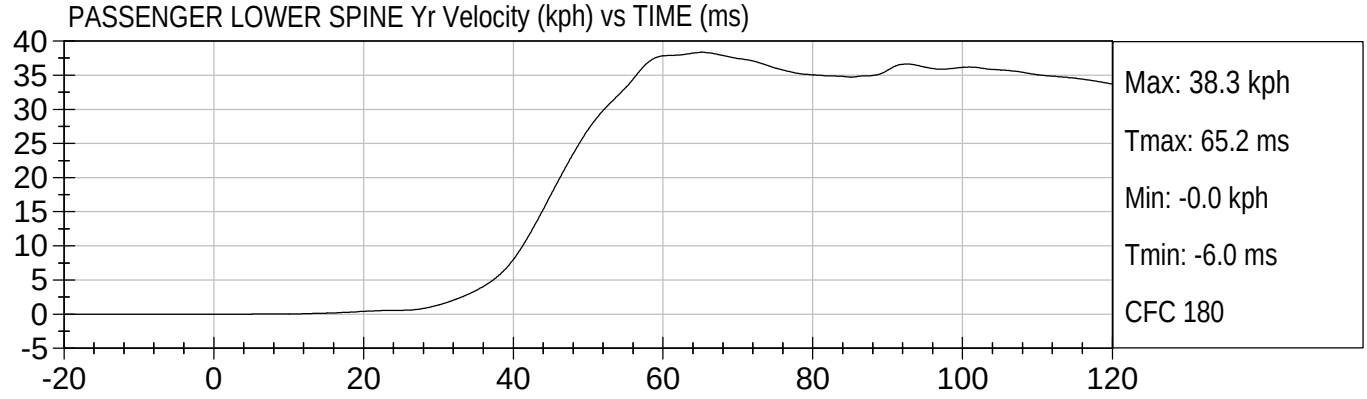
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

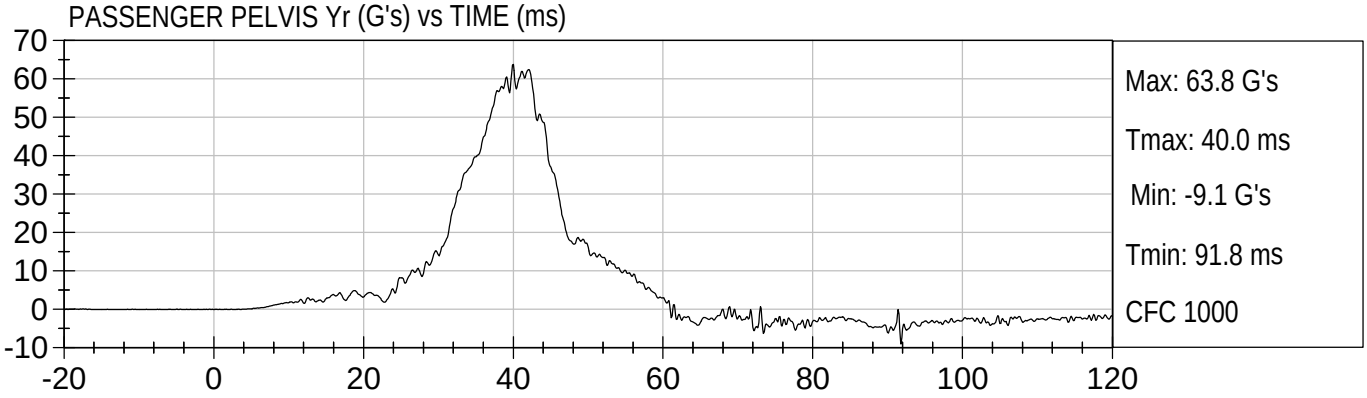
PASSENGER LOWER SPINE Yr (G's) vs TIME (ms)



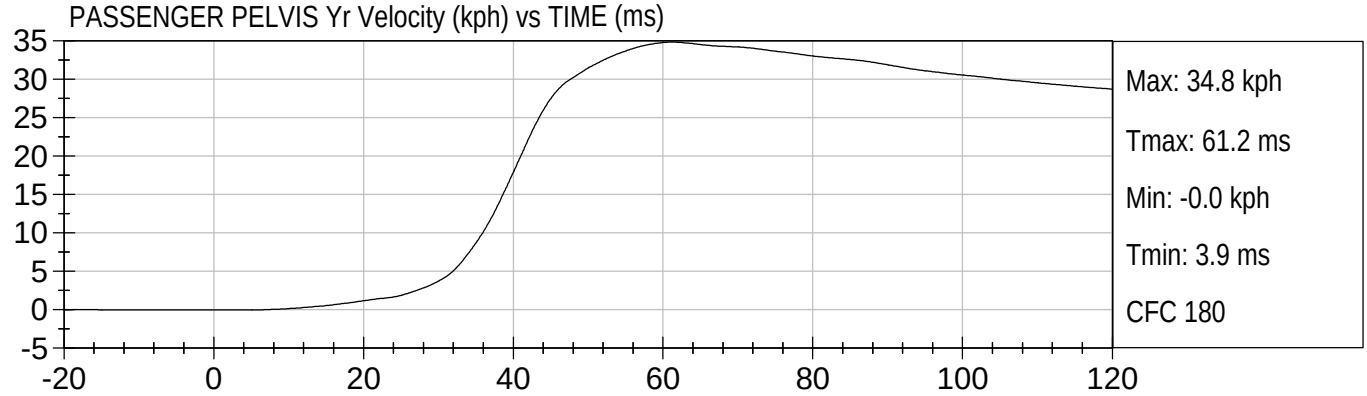
PASSENGER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



PASSENGER PELVIS Yr (G's) vs TIME (ms)



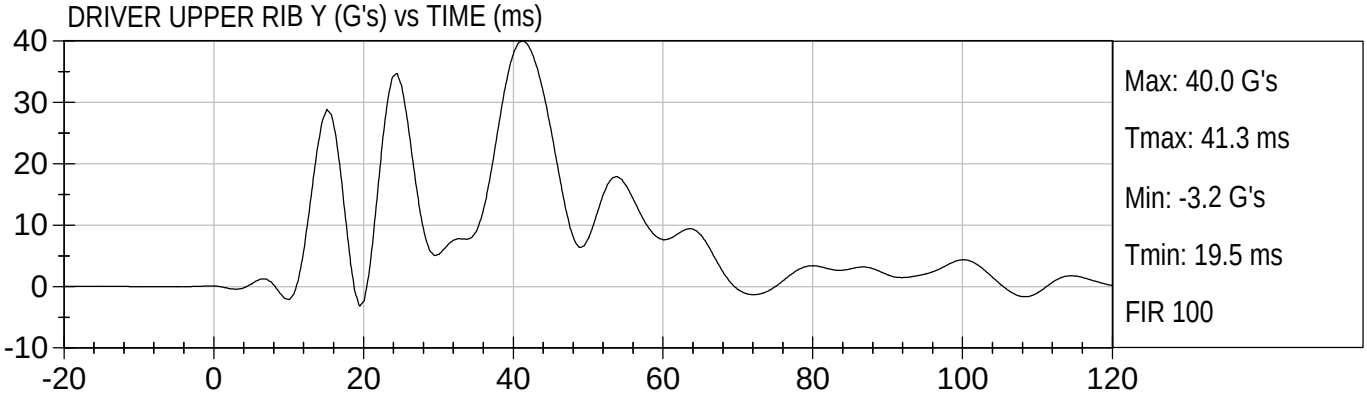
PASSENGER PELVIS Yr Velocity (kph) vs TIME (ms)



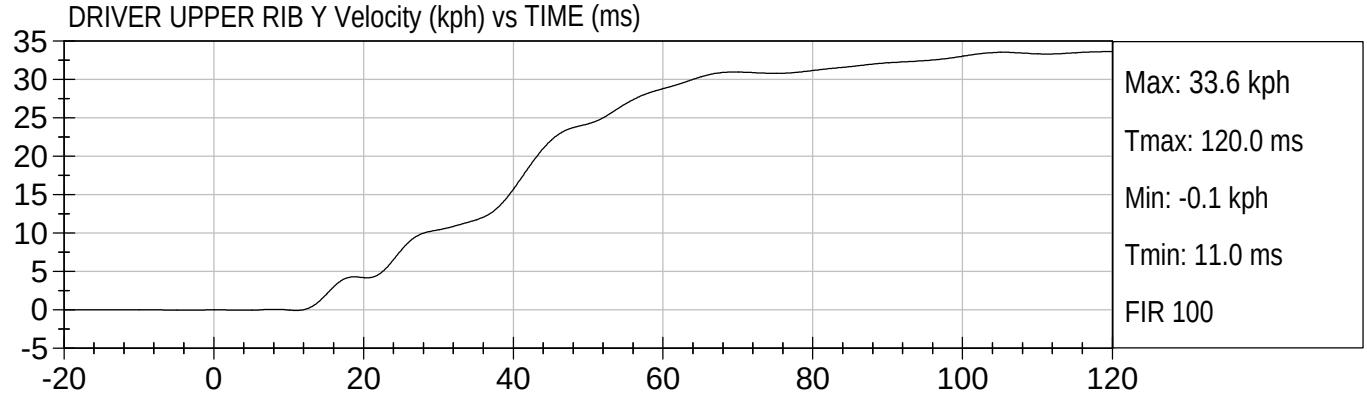
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

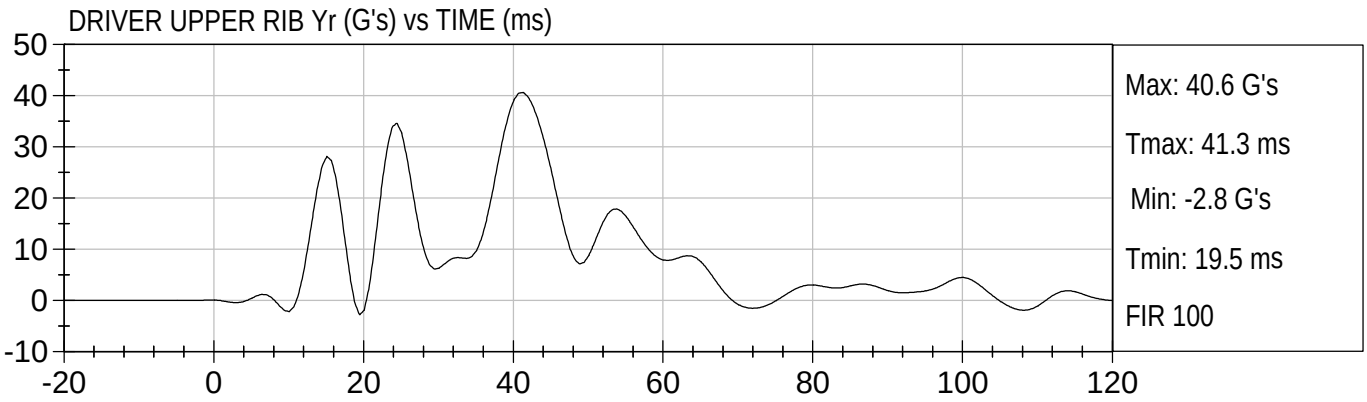
DRIVER UPPER RIB Y (G's) vs TIME (ms)



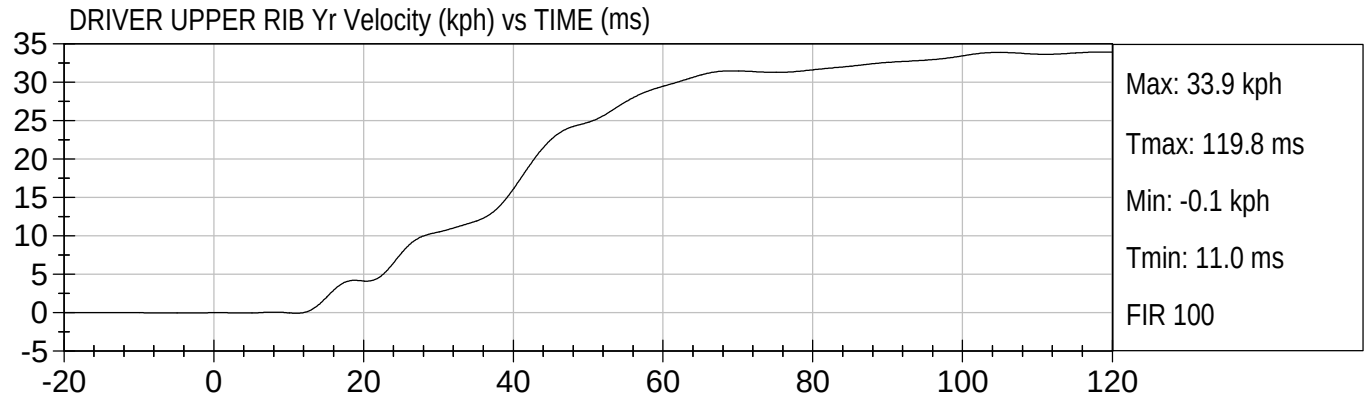
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



DRIVER UPPER RIB Yr (G's) vs TIME (ms)



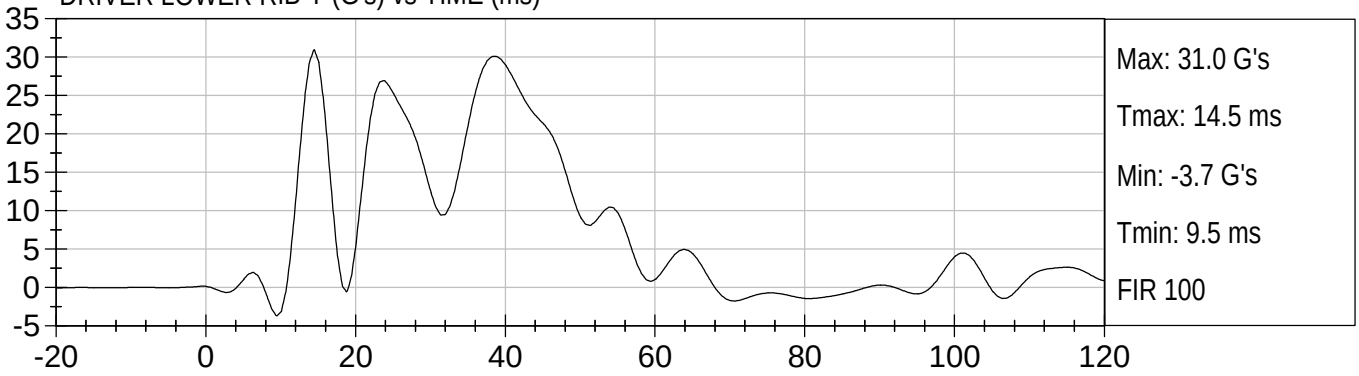
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



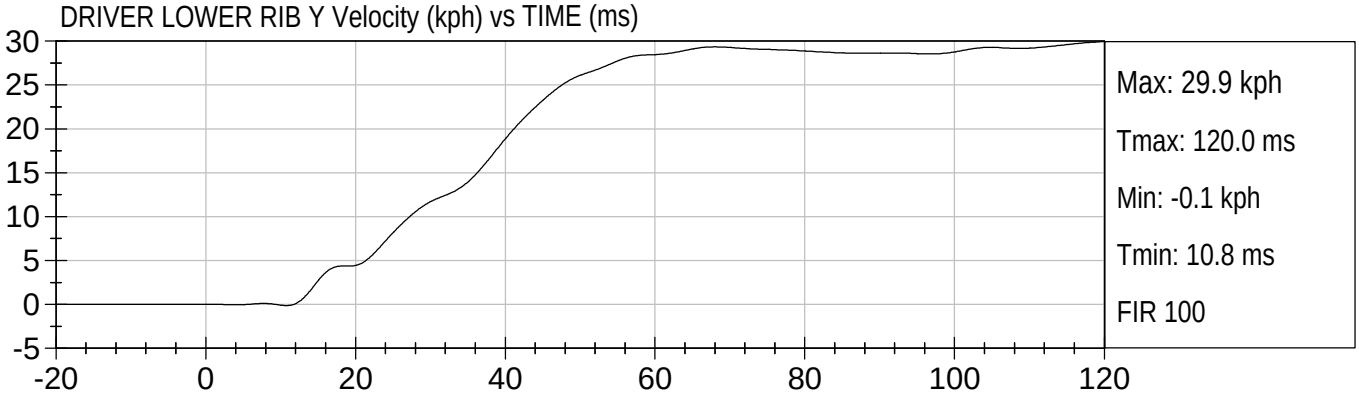
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

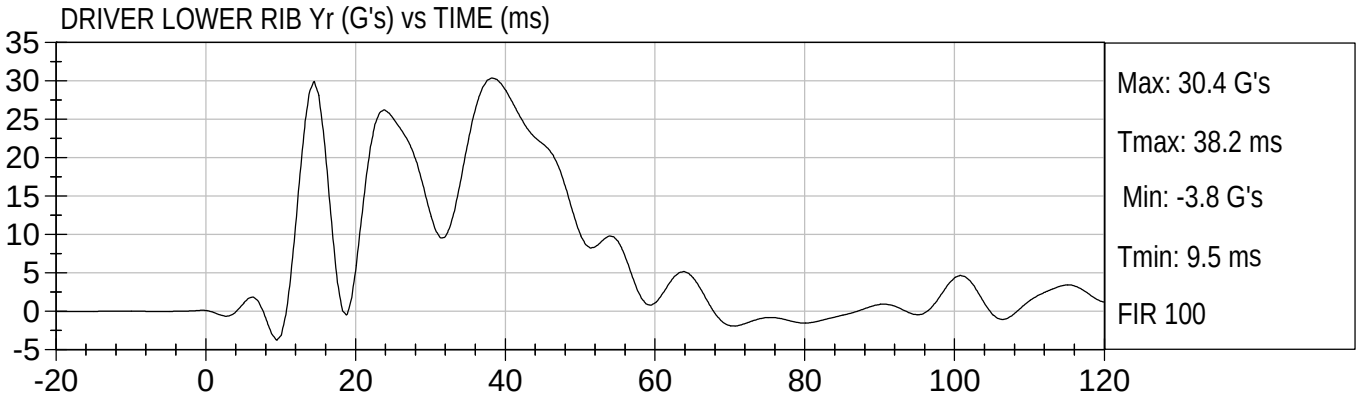
DRIVER LOWER RIB Y (G's) vs TIME (ms)



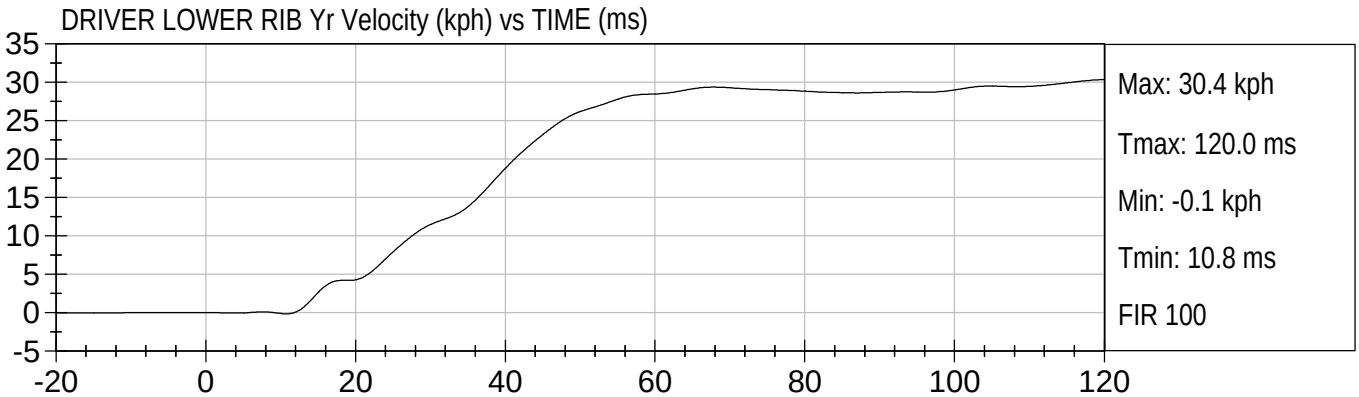
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Yr (G's) vs TIME (ms)



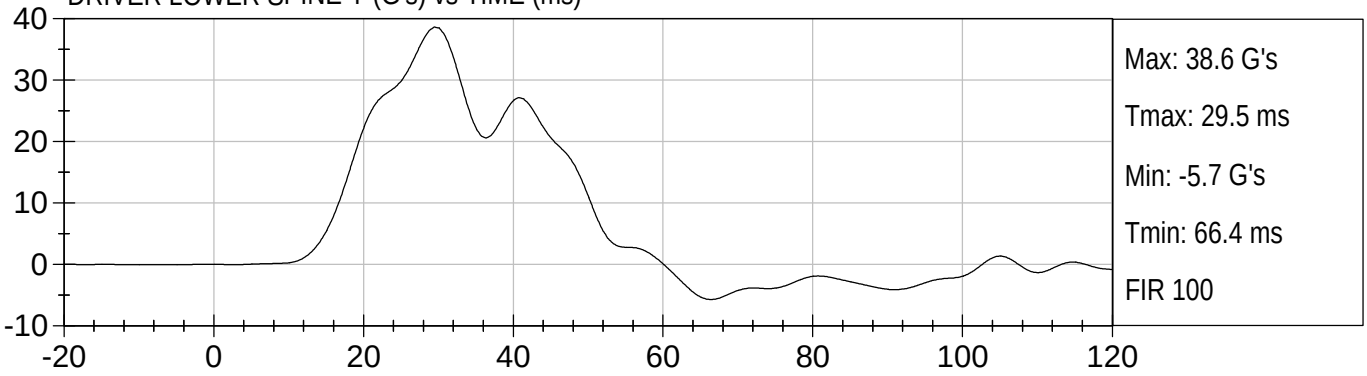
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



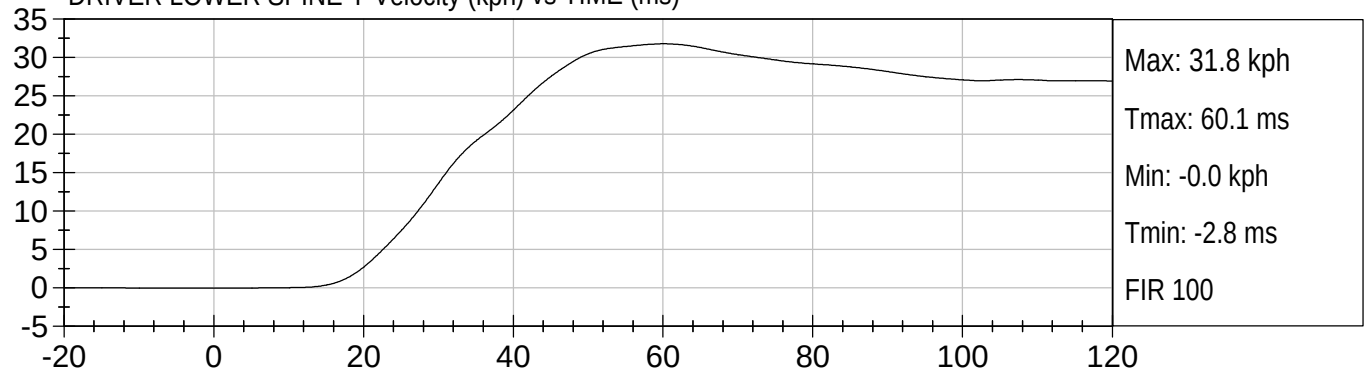
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

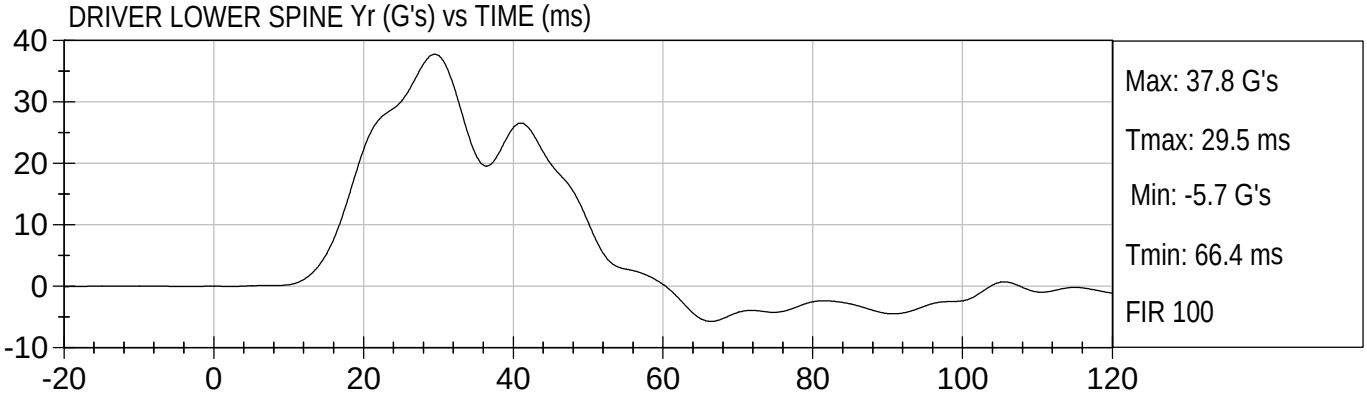
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



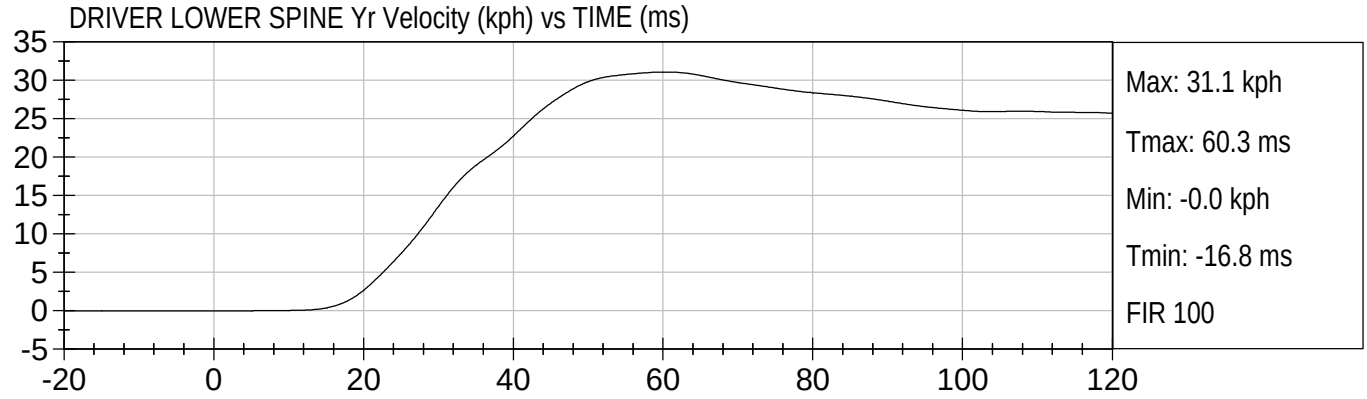
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



DRIVER LOWER SPINE Yr (G's) vs TIME (ms)

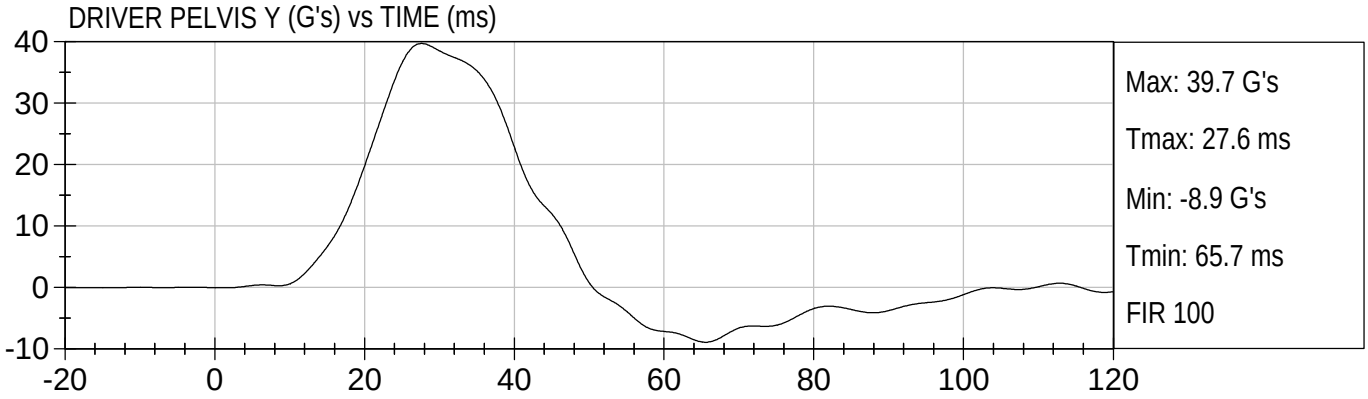


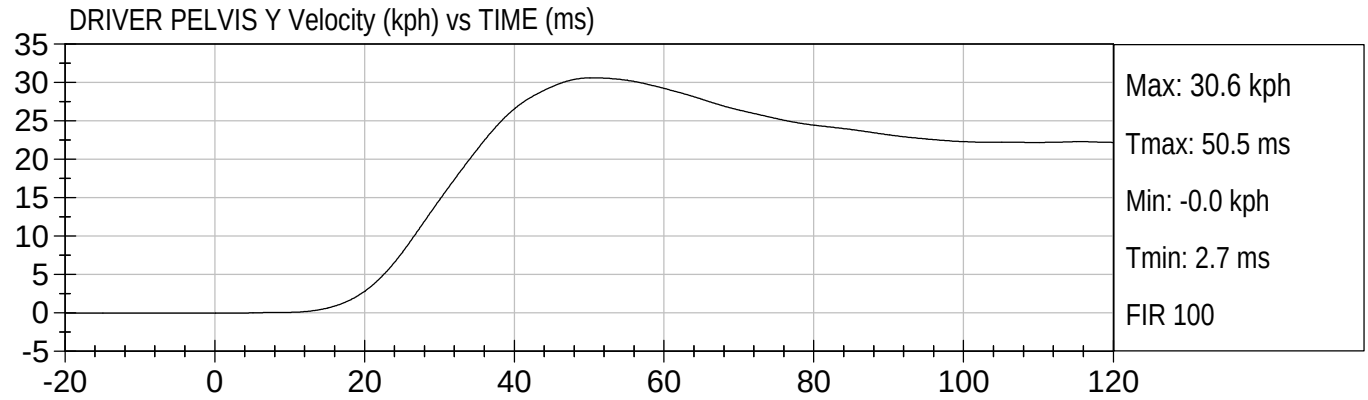
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)

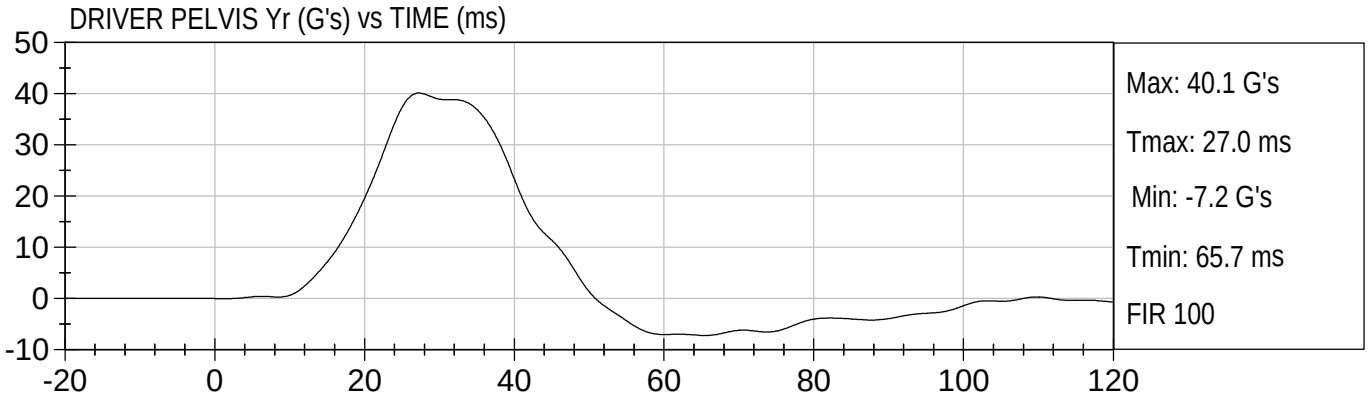


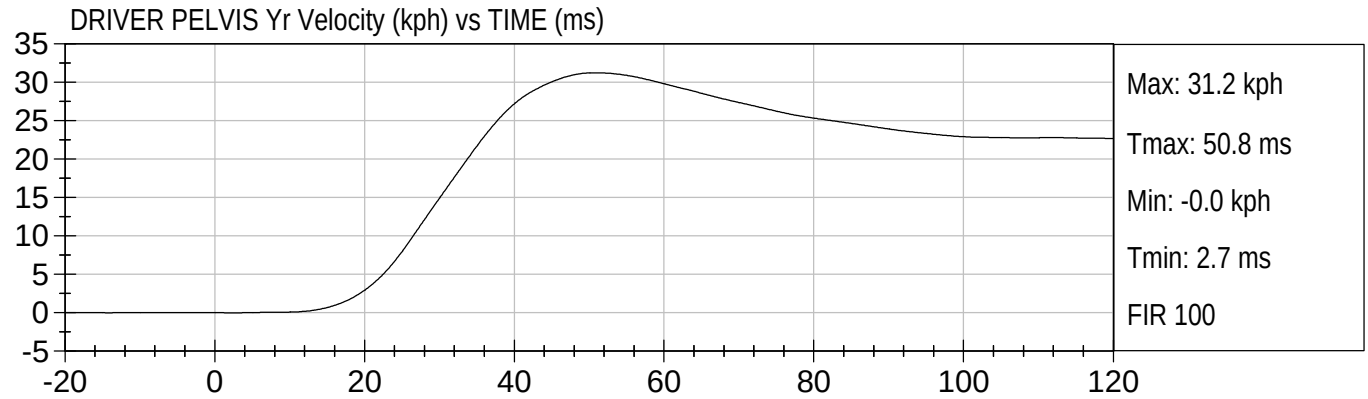
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)





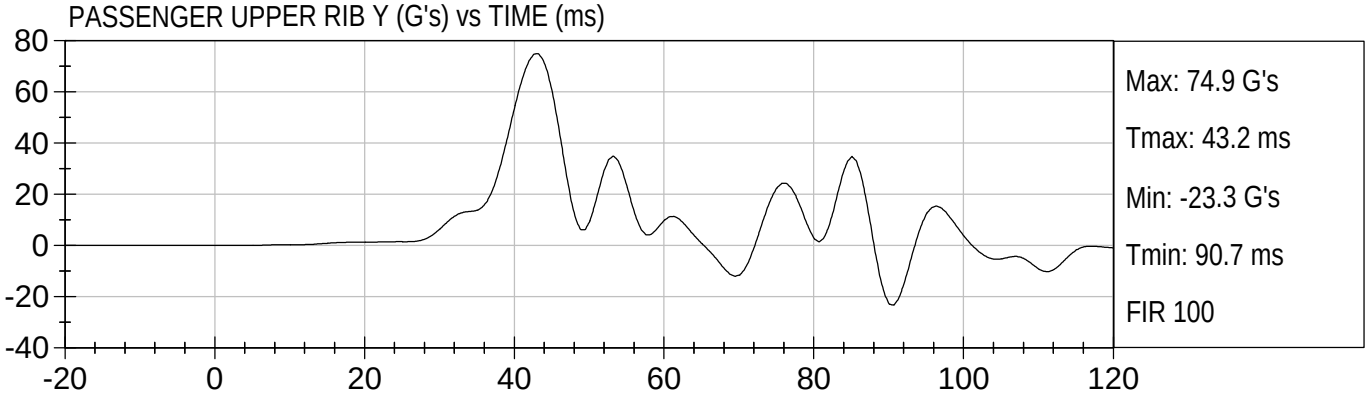




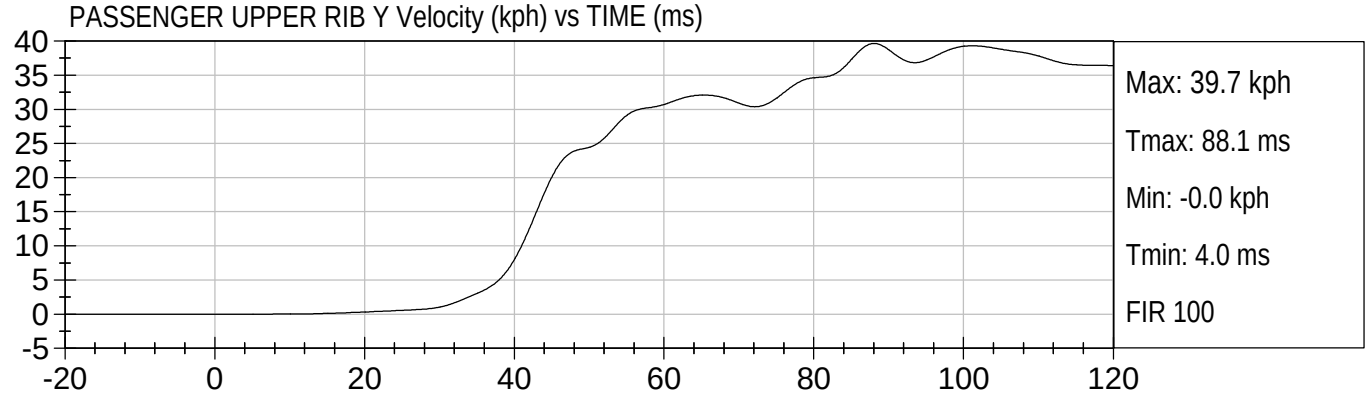
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

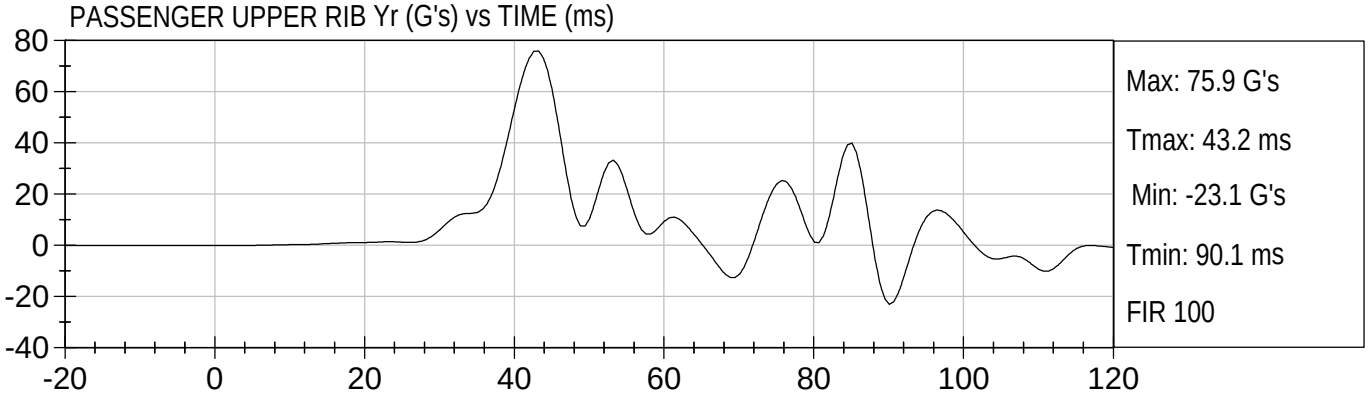
PASSENGER UPPER RIB Y (G's) vs TIME (ms)



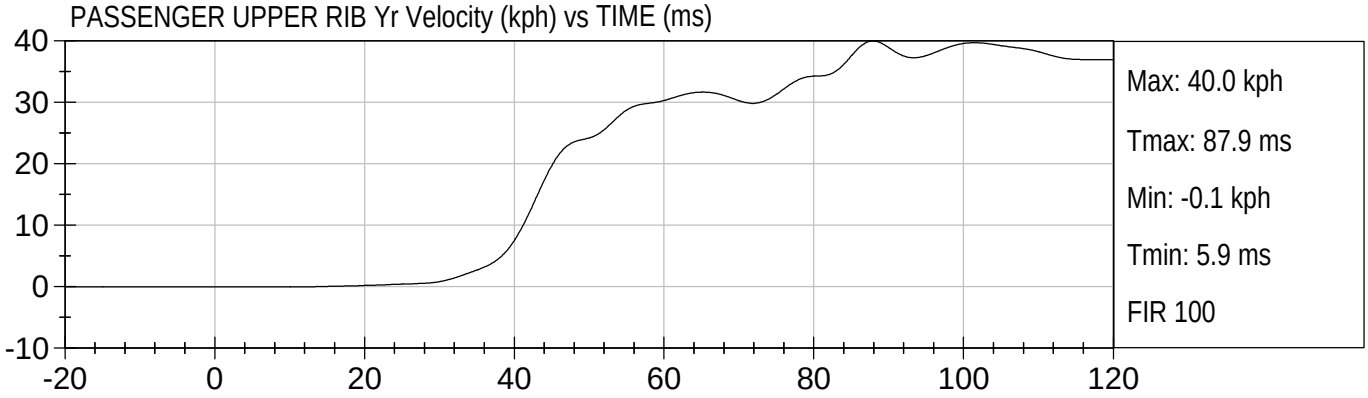
PASSENGER UPPER RIB Y Velocity (kph) vs TIME (ms)



PASSENGER UPPER RIB Yr (G's) vs TIME (ms)



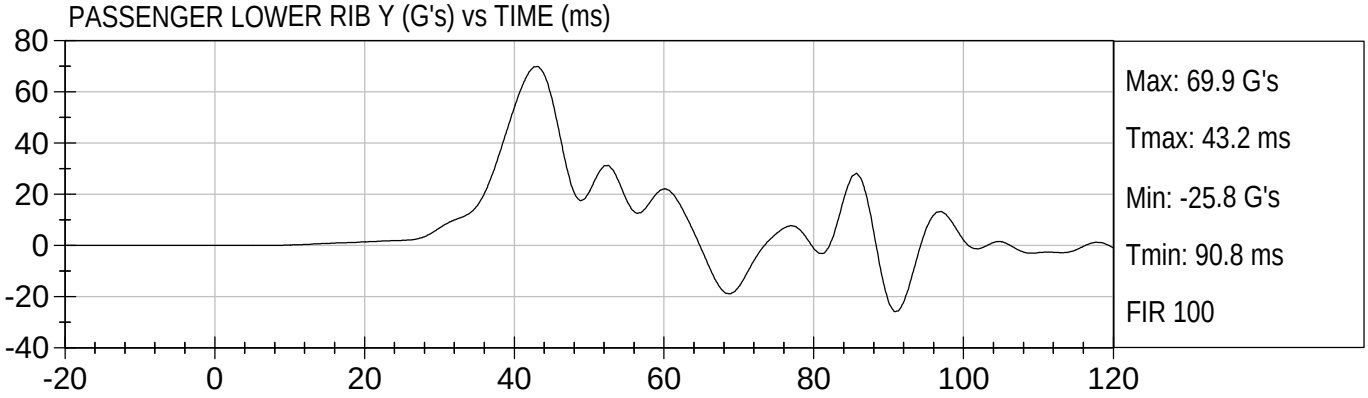
PASSENGER UPPER RIB Yr Velocity (kph) vs TIME (ms)



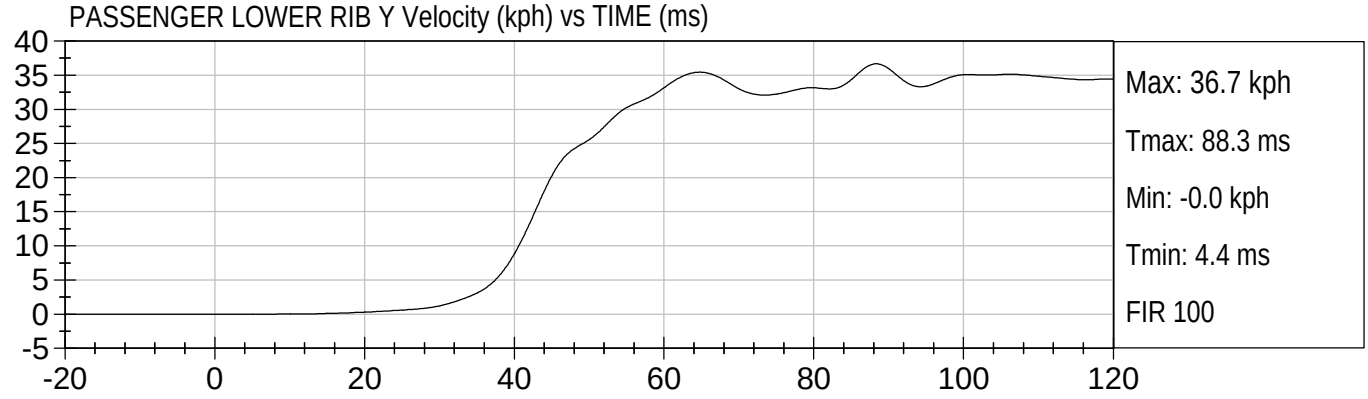
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

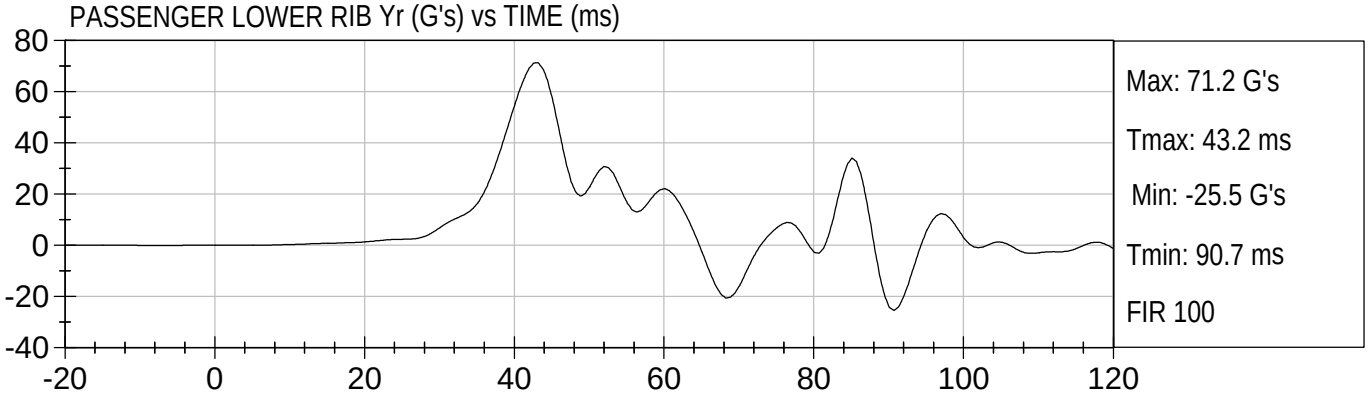
PASSENGER LOWER RIB Y (G's) vs TIME (ms)



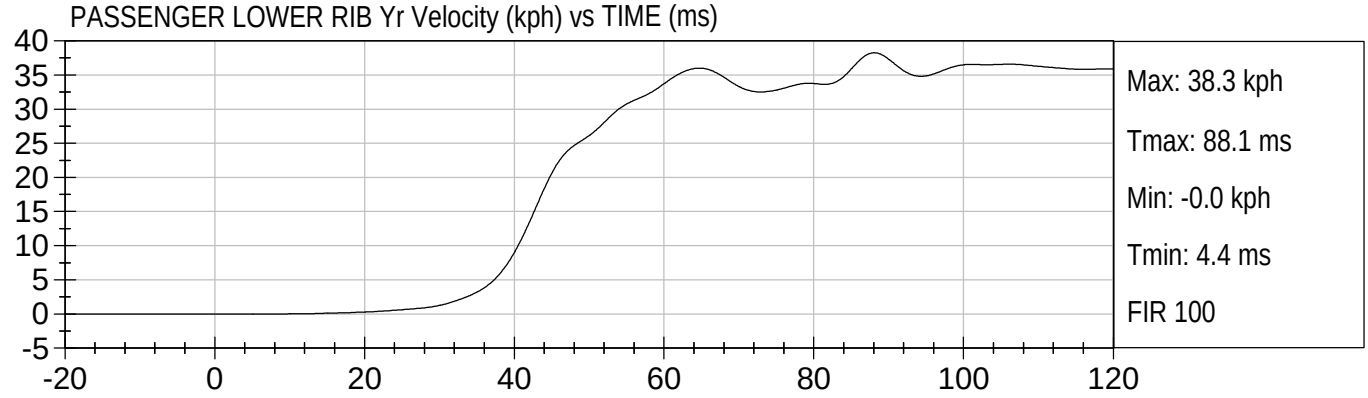
PASSENGER LOWER RIB Y Velocity (kph) vs TIME (ms)



PASSENGER LOWER RIB Yr (G's) vs TIME (ms)



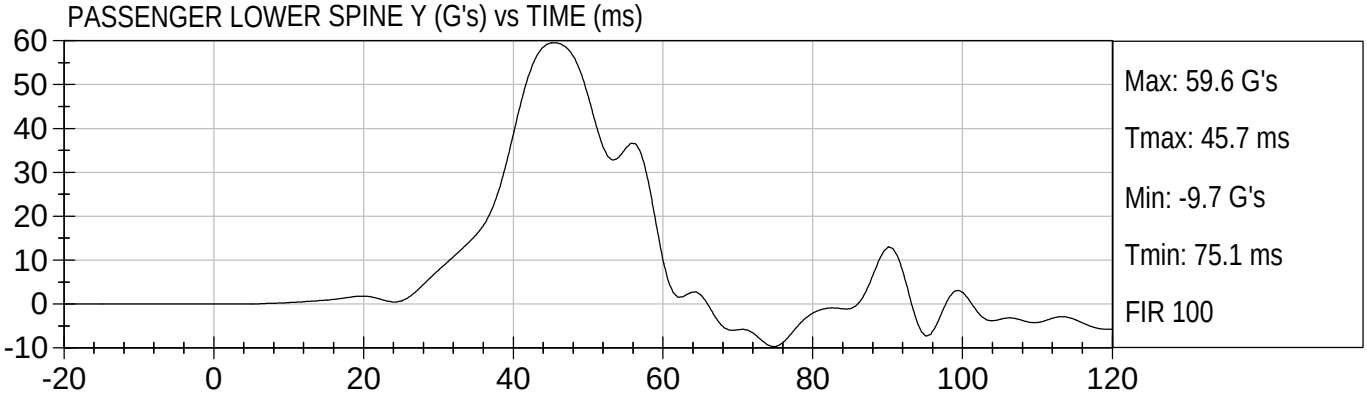
PASSENGER LOWER RIB Yr Velocity (kph) vs TIME (ms)



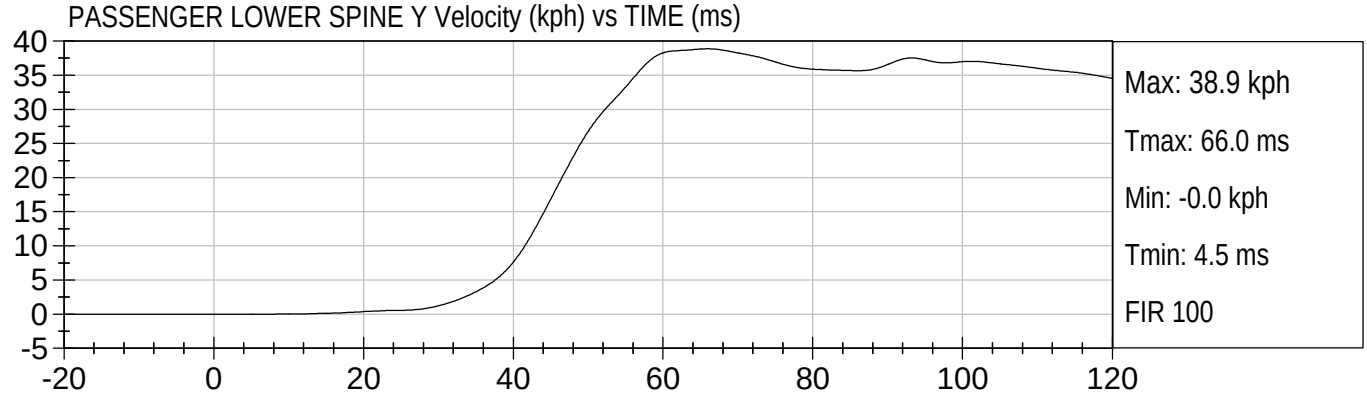
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

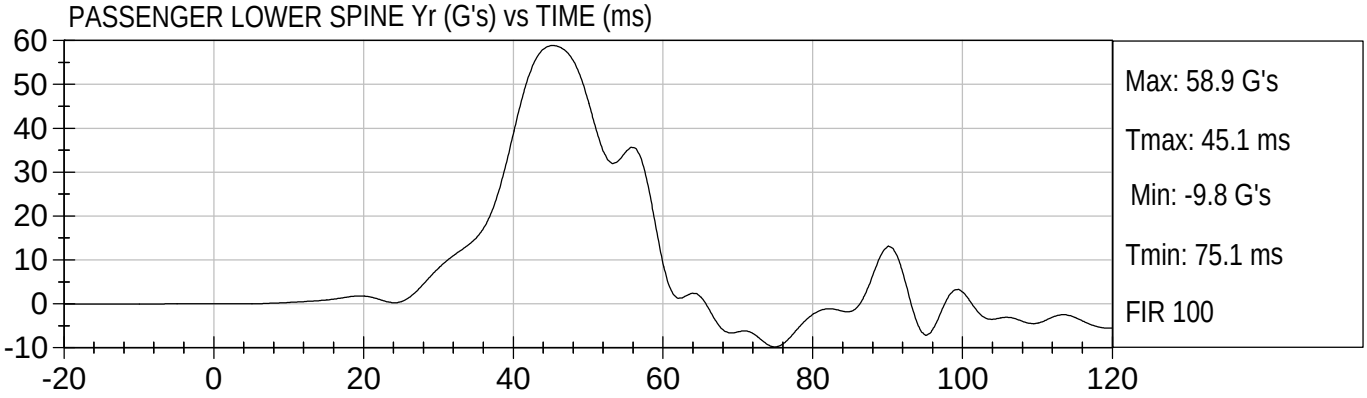
PASSENGER LOWER SPINE Y (G's) vs TIME (ms)



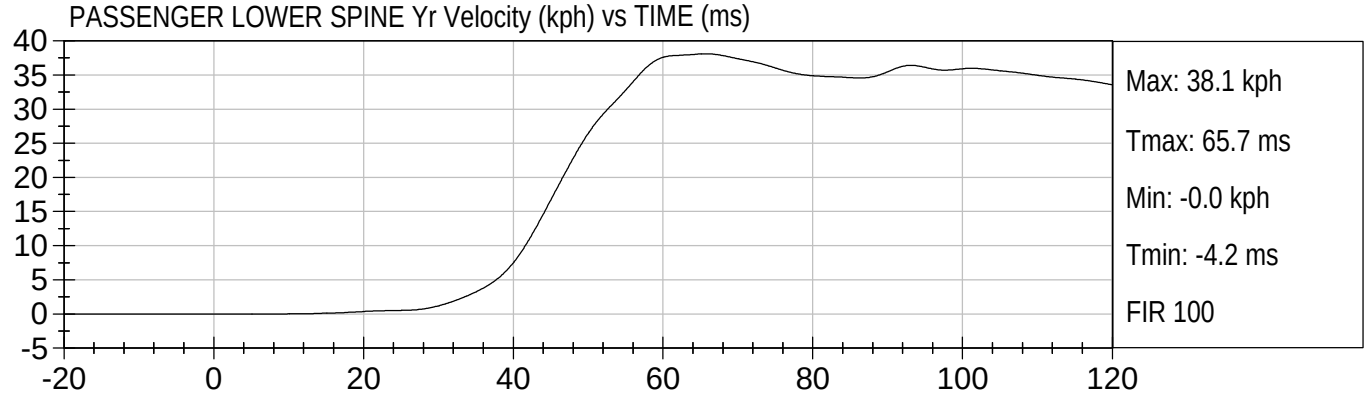
PASSENGER LOWER SPINE Y Velocity (kph) vs TIME (ms)



PASSENGER LOWER SPINE Yr (G's) vs TIME (ms)



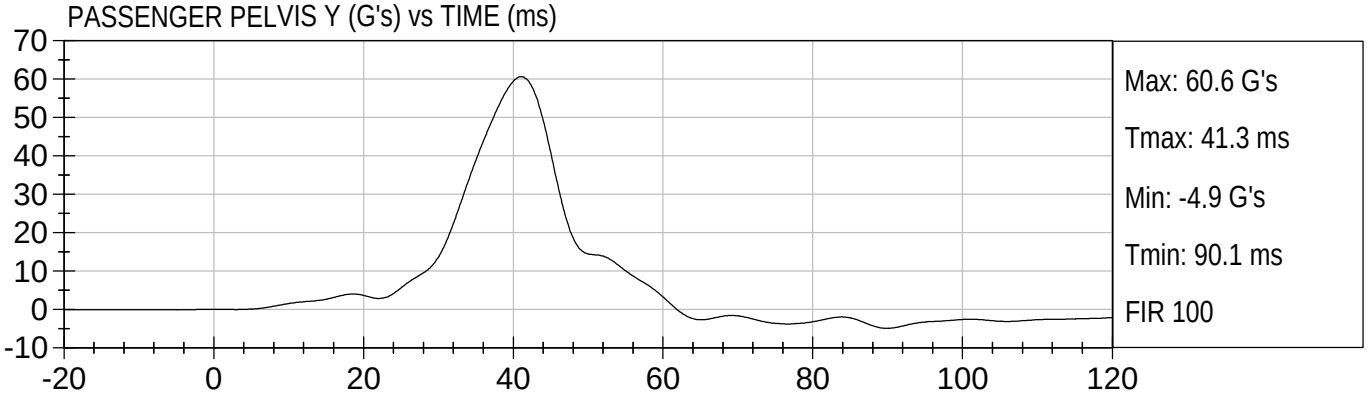
PASSENGER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



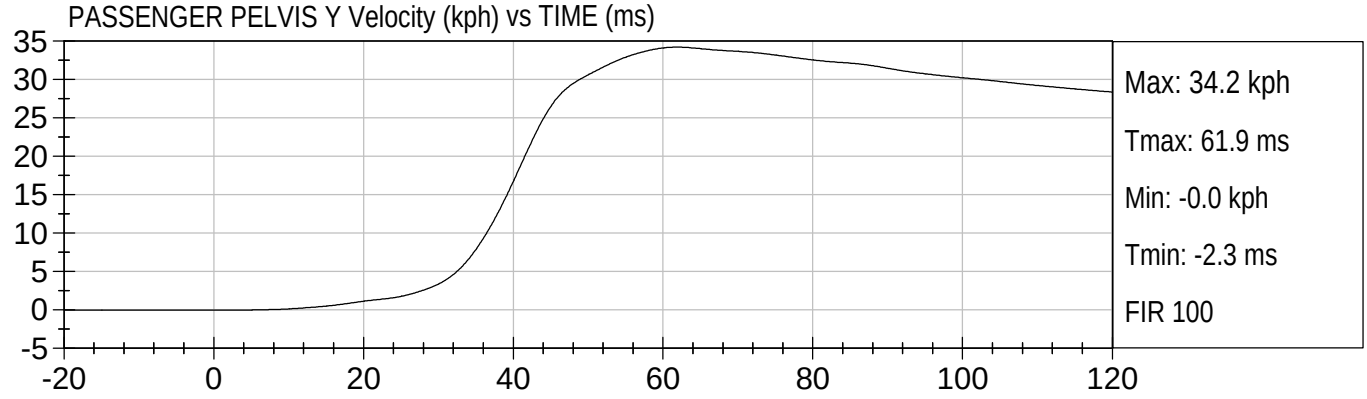
90 DEGREE INDICANT SIDE IMPACT
2002 AUDI A4 C25800

Test Date: 2/8/02
Speed: 38.2 mph (61.5 km/h)

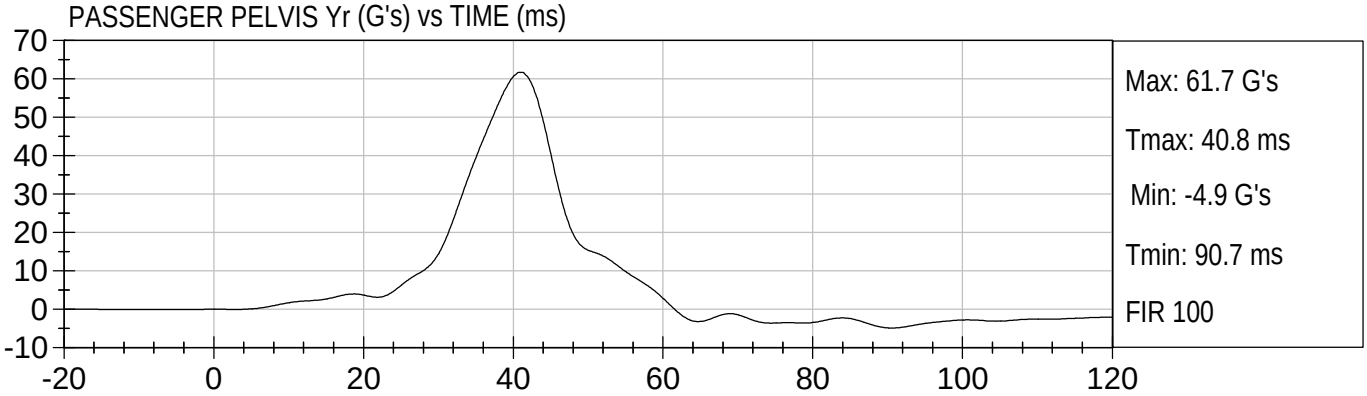
PASSENGER PELVIS Y (G's) vs TIME (ms)



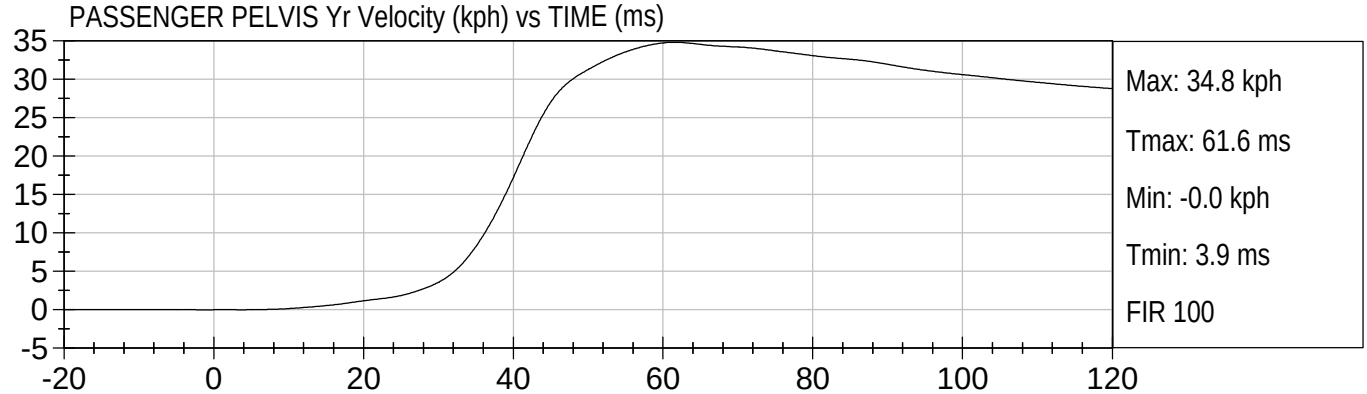
PASSENGER PELVIS Y Velocity (kph) vs TIME (ms)



PASSENGER PELVIS Yr (G's) vs TIME (ms)



PASSENGER PELVIS Yr Velocity (kph) vs TIME (ms)



APPENDIX C

SID CONFIGURATION AND PERFORMANCE VERIFICATION DATA

SID Calibration Data Sheet

Side Impact Dummy

Configured to Left Side Impact

Technician:Tim Michnay

Tested Parameter	Units	Specification	Dummy Serial Number: 48		Dummy Serial Number: 49	
			Pre-Test	Post-Test	Pre-Test	Post-Test
SH – Seated Height	mm	889 - 909	902	902	898	898
RH – Rib Height	mm	501 – 521	507	507	517	517
HP – Hip Pivot Height	mm	99 ref.	99	99	99	99
RD-Rib from Back Line	mm	229 – 241	236	236	232	232
KV – Knee Pivot from Back Line	mm	511 – 526	519	519	522	522
SW – Knee Pivot to Floor	mm	490 – 505	492	492	492	492
HW – Hip Width	mm	356 – 391	364	364	367	367
Thorax Impact						
Laboratory Temperature	°C	18.9 to 25.5	21.8	23.1	21.7	23.2
Laboratory Relative Humidity	%	10 to 70	23	22	23	22
Probe Velocity	m/s	4.27 – 4.33	4.27	4.27	4.27	4.27
Upper Rib	G's	37 – 46	40	38	37	41
Lower Rib	G's	37 – 46	38	37	42	40
Lower Spine	G's	15 – 22	19	19	19	19
Pelvis Impact						
Laboratory Temperature	°C	18.9 to 25.5	21.8	23.1	21.7	23.2
Laboratory Relative Humidity	%	10 to 70	23	22	23	22
Probe Velocity	m/s	4.27 – 4.33	4.28	4.27	4.28	4.28
Pelvis	G's	40 - 60	48	43	50	49

CERTIFICATION DATA

Dummy Serial Number: 048

Calibration Test Results Summary

Dummy Serial Number: 048

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

External Measurements

ATD Serial No.:048 Test Number:D0216

Tested Parameter	Units	Specification	Result	Pass/Fail
SH – Seated Height	mm	889 - 909	902	Pass
RH – Rib Height	mm	501 – 521	507	Pass
HP – Hip Pivot Height	mm	99 ref.	99	Pass
RD-Rib from Back Line	mm	229 – 241	236	Pass
KV – Knee Pivot from Back Line	mm	511 – 526	519	Pass
SW – Knee Pivot to Floor	mm	490 – 505	492	Pass
HW – Hip Width	mm	356 – 391	364	Pass
		Overall Test Results		Pass

2/6/02

Laboratory Technician Test Date

Approved By

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration

ATD Serial No.:048 Test I.D.:D02161

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	210 to 260	242	Pass
Peak Lateral Acceleration	G's	< 10	-3	Pass
Time Above 100 G	msec	0.9 – 1.5	1.1	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

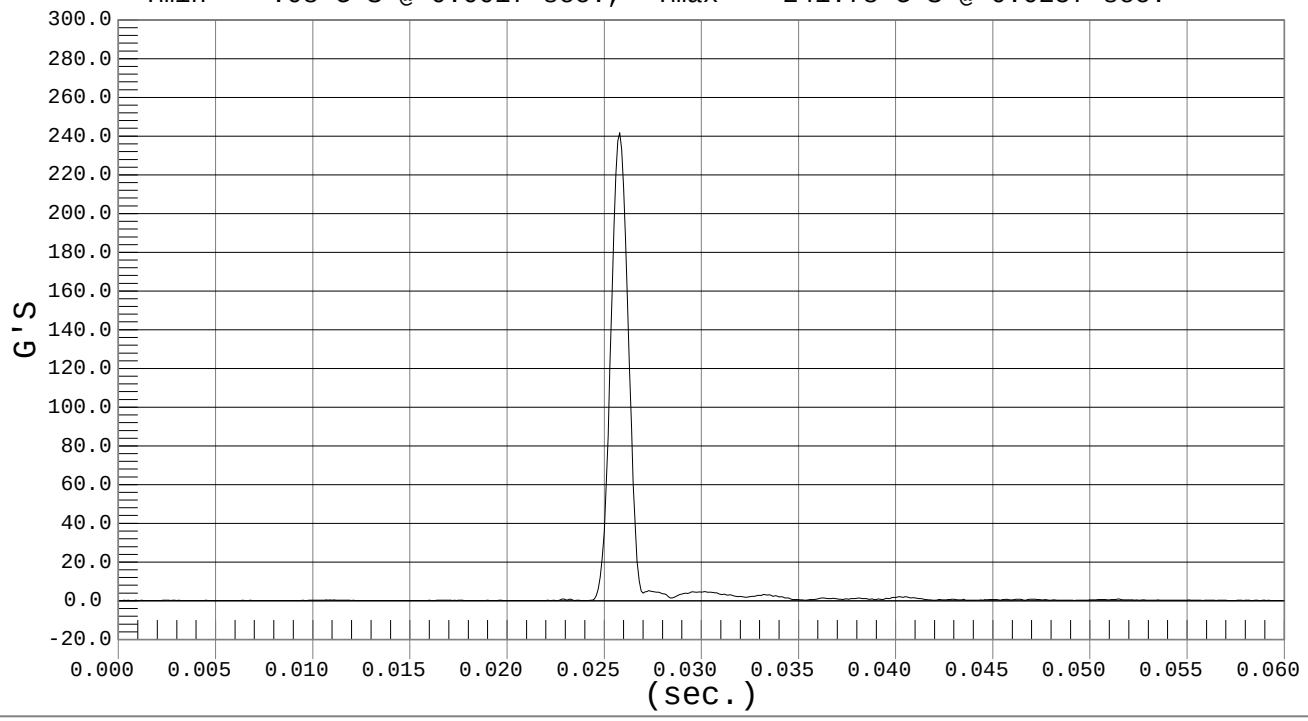
Approved By

PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #048

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = .08 G'S @ 0.0017 sec., Ymax = 241.78 G'S @ 0.0257 sec.

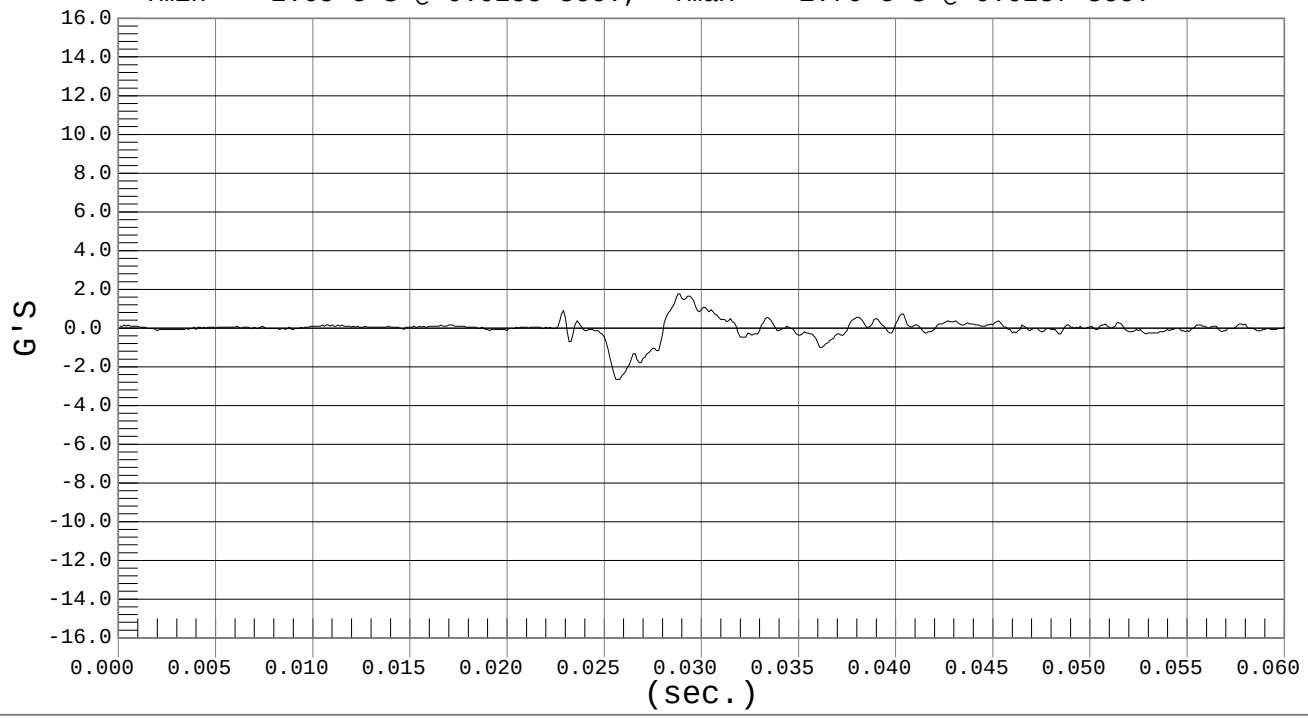


PEAK LATERAL ACCELRATION

Test Desc.: Head Drop
Component: Dummy #048

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -2.65 G'S @ 0.0255 sec., Ymax = 1.76 G'S @ 0.0287 sec.



SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Calibration

ATD Serial No.:048 Test I.D.:D02162

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	4.27 – 4.33	4.27	Pass
Upper Rib	G's	37 – 46	40	Pass
Lower Rib	G's	37 – 46	38	Pass
Lower Spine	G's	15 - 22	19	Pass
		Overall Test Results		Pass

2/6/02

Laboratory Technician Test Date

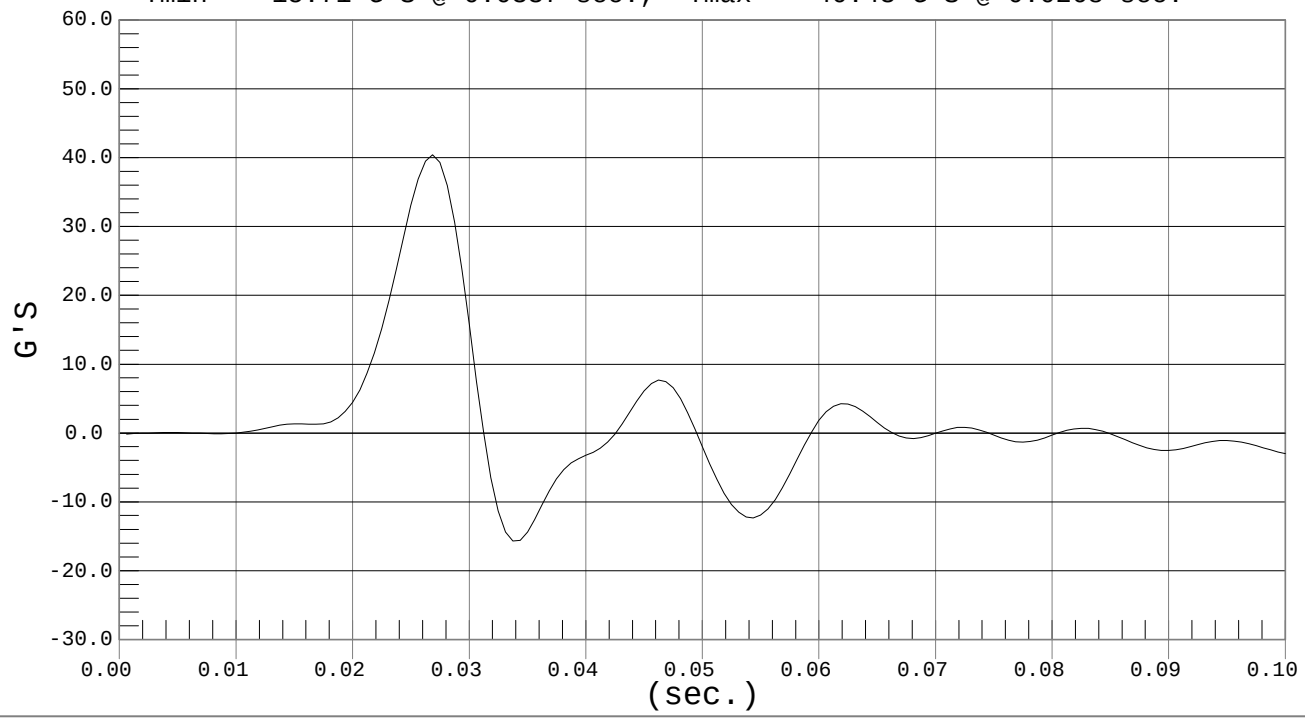
Approved By

UPPER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -15.71 G'S @ 0.0337 sec., Ymax = 40.43 G'S @ 0.0268 sec.

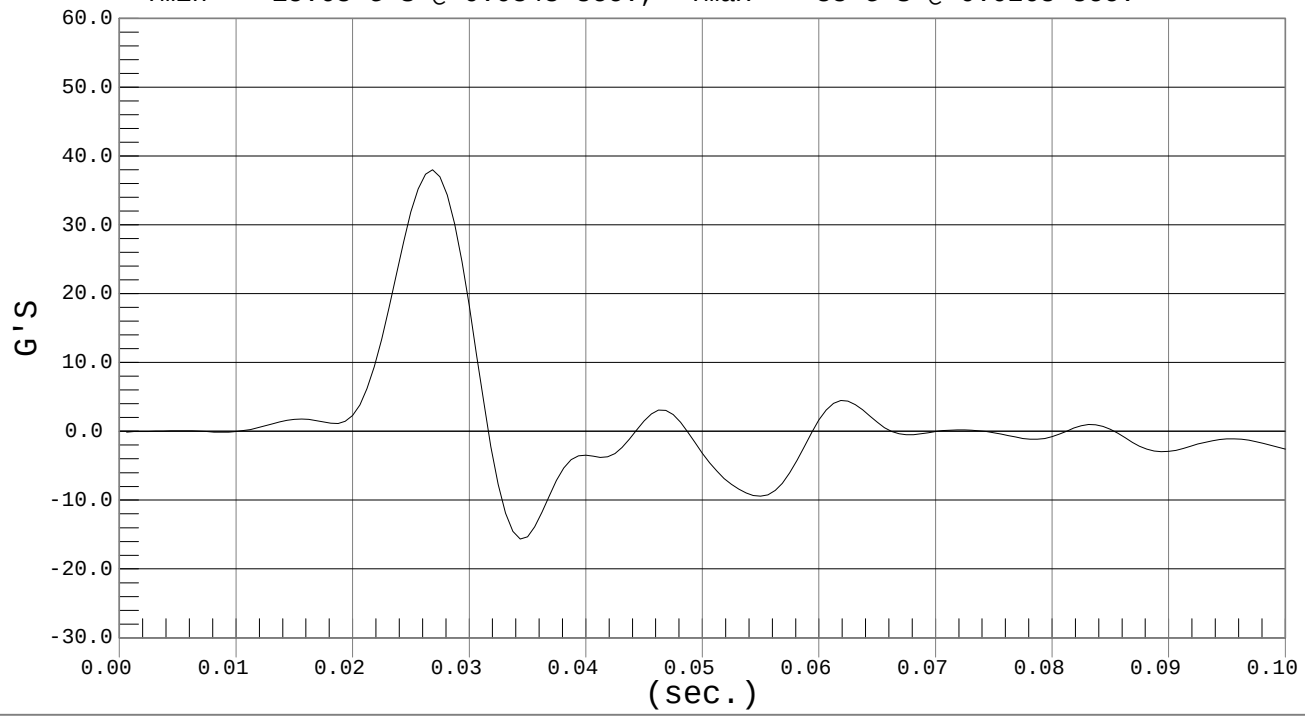


LOWER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -15.63 G'S @ 0.0343 sec., Ymax = 38 G'S @ 0.0268 sec.

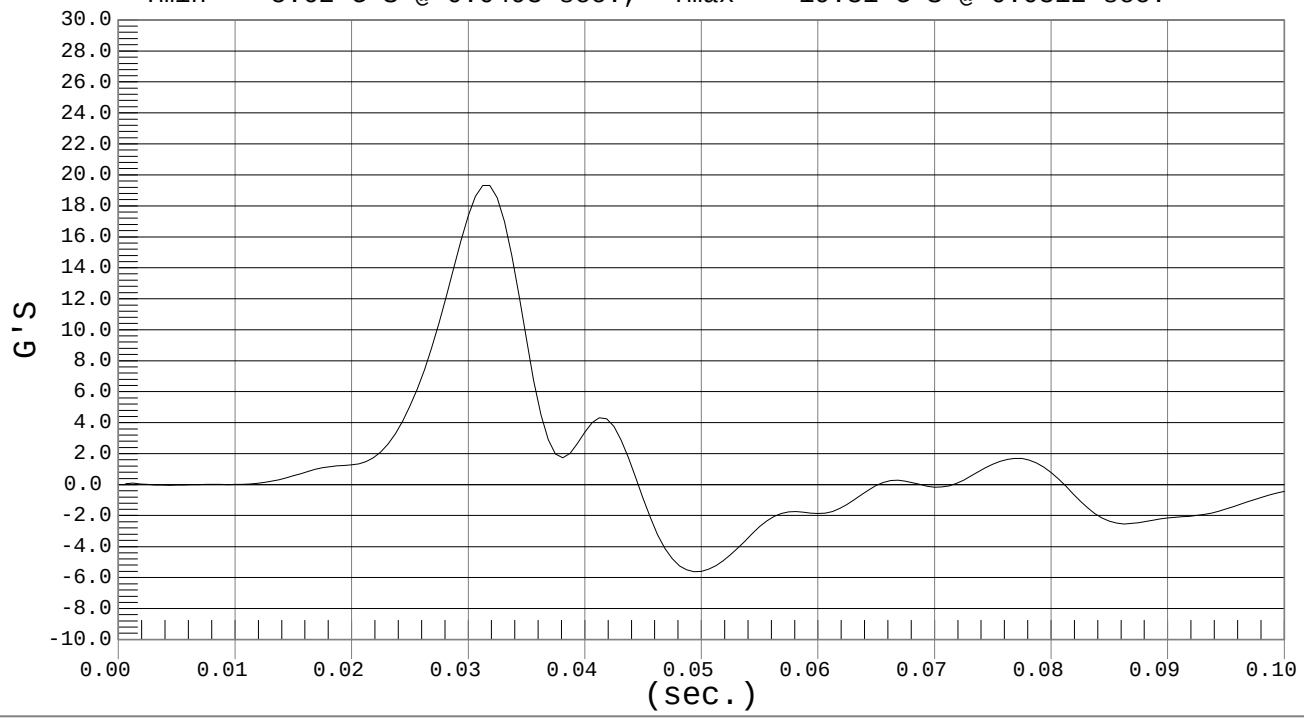


LOWER SPINE ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -5.62 G'S @ 0.0493 sec., Ymax = 19.31 G'S @ 0.0312 sec.



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Calibration

ATD Serial No.:048 Test I.D.:D02163

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	4.27 – 4.33	4.28	Pass
Pelvis Acceleration	G's	40 - 60	48	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

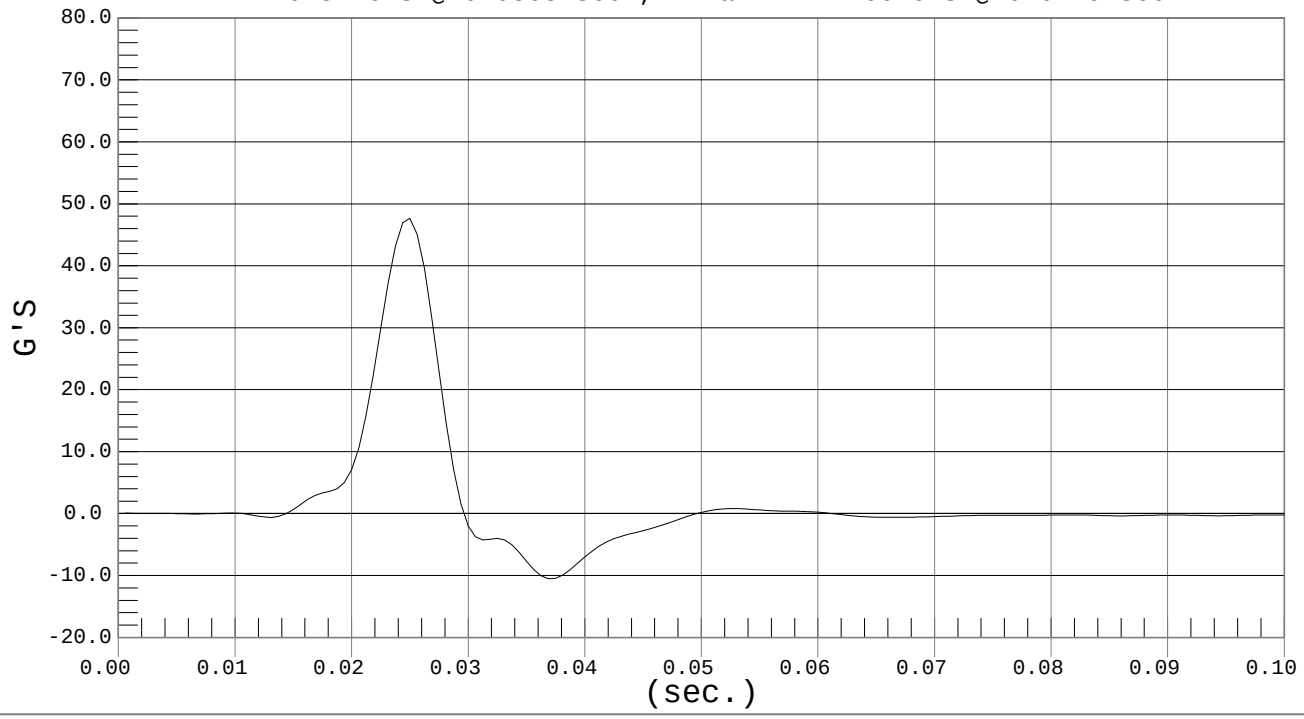
Approved By

PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #048

Test Date: 02-06-02
Speed: 14.0 fps, 4.28 M/s

Ymin = -10.51 G'S @ 0.0368 sec., Ymax = 47.66 G'S @ 0.0249 sec.



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Preload = 10 lbs)

ATD Serial No.:048 Test I.D.:D02164

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Force @ 12.7	mm	104 – 162	126	Pass
Force @ 19	mm	163 – 222	177	Pass
Force @ 25.4	mm	222 – 280	243	Pass
Force @ 33	mm	325 - 391	338	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

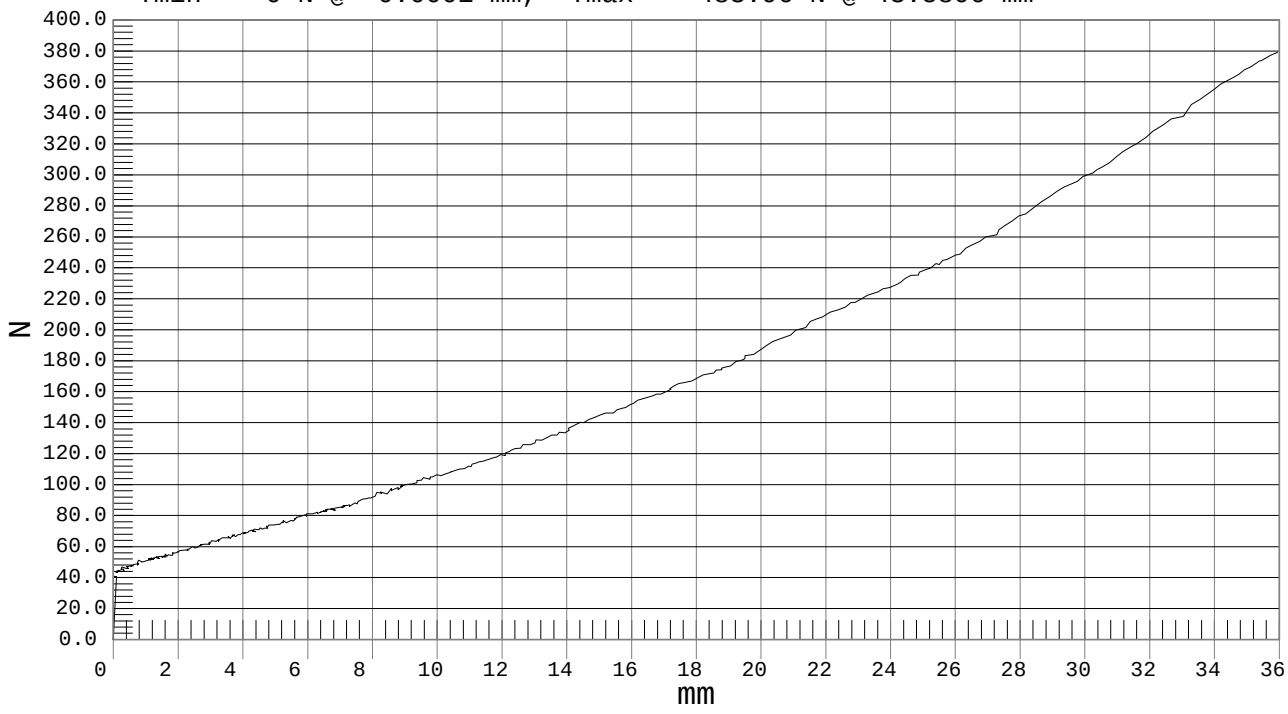
Approved By

ABDOMEN COMPRESSION

Test Desc.: ABDOMEN COMPRESSION
Component: DUMMY # 048

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = 0 N @ -0.0001 mm, Ymax = 483.96 N @ 43.5806 mm



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No.:048 Test I.D.:D02165

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Force @ 0	mm	0 – 26.7	0	Pass
Force @ 20	mm	97.9 – 151.2	106.9	Pass
Force @ 30	mm	151.2 – 204.6	178.6	Pass
Force @ 40	mm	204.6 – 258.0	230.4	Pass
Return Angle	Degrees	12 Maximum	6	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

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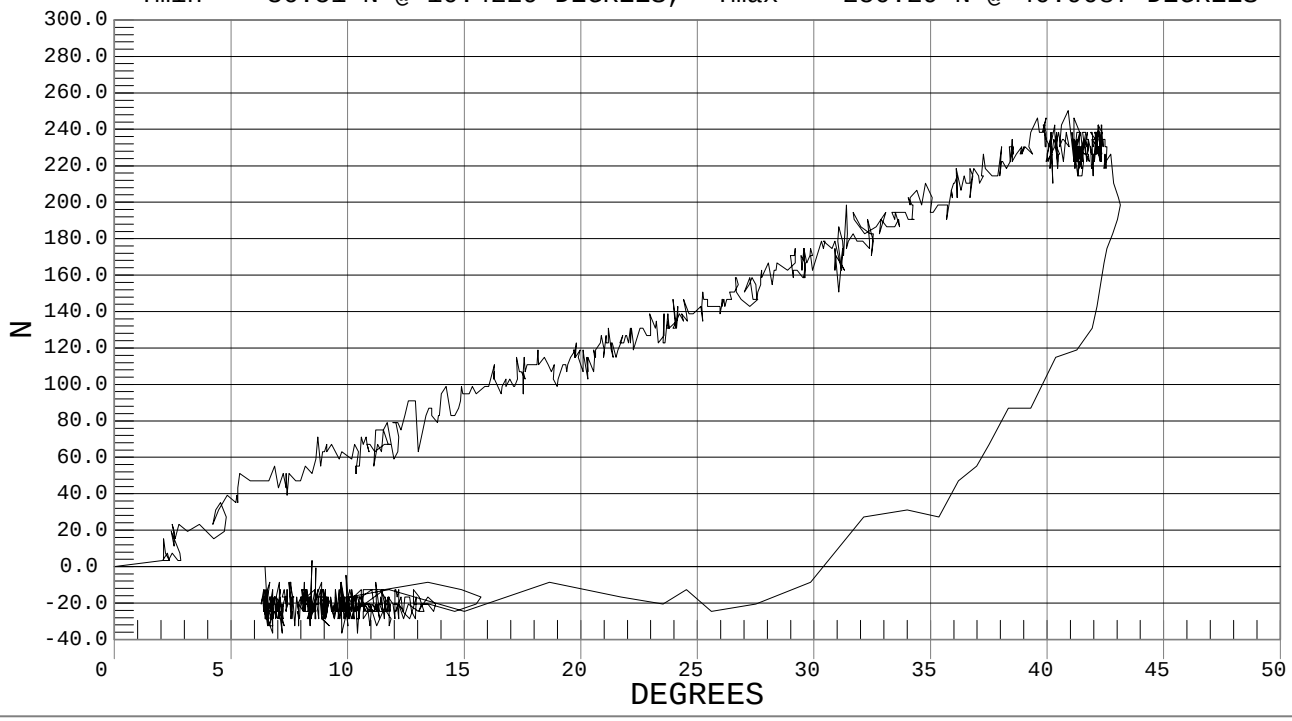
Approved By

LUMBAR FLEXION

Test Desc.: LUMBAR FLEXION
Component: DUMMY # 048

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -36.51 N @ 10.4229 DEGREES, Ymax = 250.29 N @ 40.9087 DEGREES



SID Calibration Data Sheet

Side Impact Dummy

Inspection Checklist

ATD Serial No.:048

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, weldment, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Pass Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Notes (include component/problem/section/reason):

_____ 2/6/02

Laboratory Technician Test Date

_____

Approved By

CERTIFICATION DATA

Dummy Serial Number: 049

Calibration Test Results Summary

Dummy Serial Number: 049

Pre-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

External Measurements

ATD Serial No.:049 Test Number: D0217

Tested Parameter	Units	Specification	Result	Pass/Fail
SH – Seated Height	mm	889 - 909	898	Pass
RH – Rib Height	mm	501 – 521	517	Pass
HP – Hip Pivot Height	mm	99 ref.	99	Pass
RD-Rib from Back Line	mm	229 – 241	232	Pass
KV – Knee Pivot from Back Line	mm	511 – 526	522	Pass
SW – Knee Pivot to Floor	mm	490 – 505	492	Pass
HW – Hip Width	mm	356 – 391	367	Pass
		Overall Test Results		Pass

2/6/02

Laboratory Technician Test Date

Approved By

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration

ATD Serial No.:048 Test I.D.:D02171

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	210 to 260	212	Pass
Peak Lateral Acceleration	G's	< 10	-5	Pass
Time Above 100 G	msec	0.9 – 1.5	1.2	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

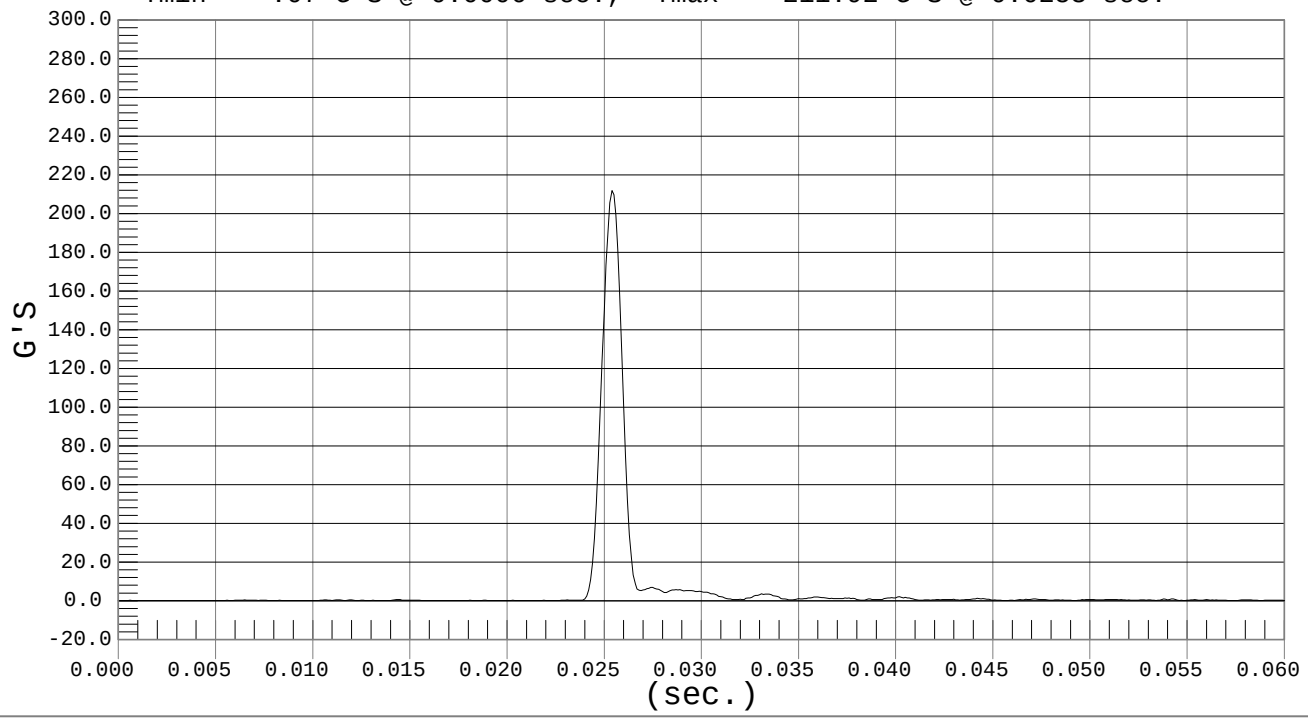
Approved By

PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #049

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = .07 G'S @ 0.0006 sec., Ymax = 211.92 G'S @ 0.0253 sec.

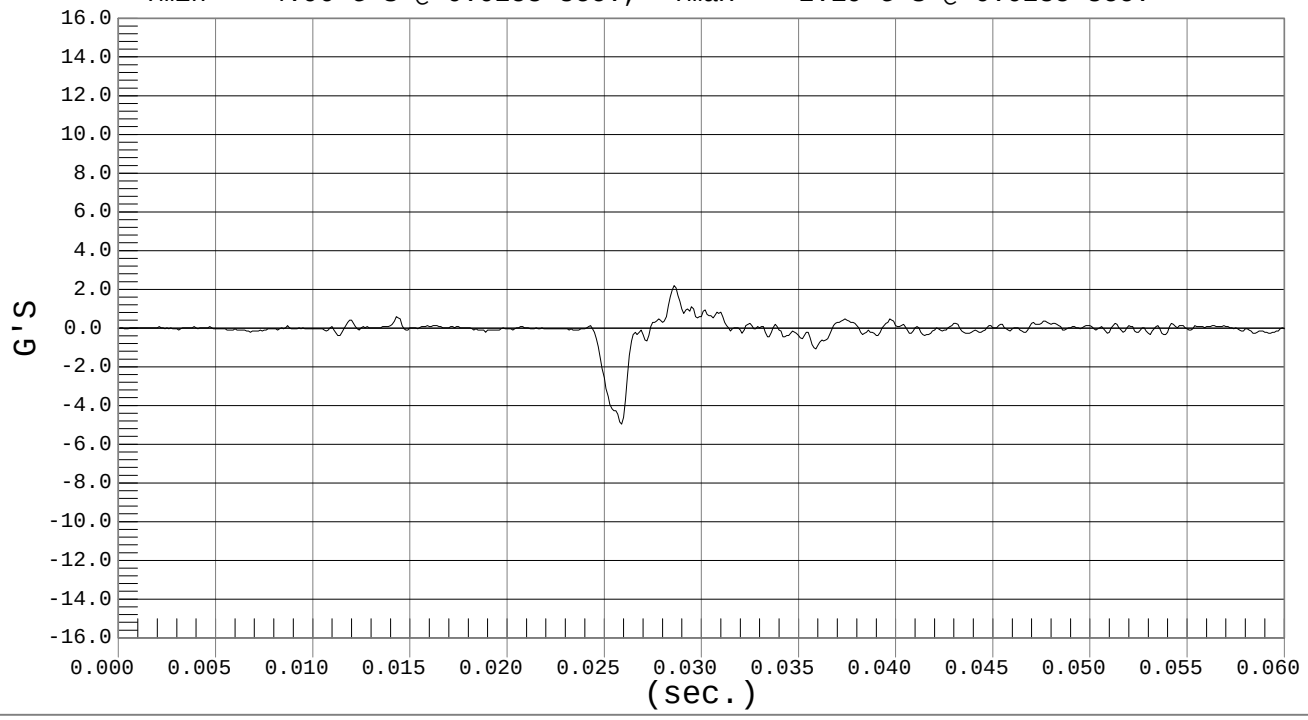


PEAK LATERAL ACCELRATION

Test Desc.: Head Drop
Component: Dummy #049

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -4.96 G'S @ 0.0258 sec., Ymax = 2.19 G'S @ 0.0285 sec.



SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Calibration

ATD Serial No.:049 Test I.D.:D02172

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Velocity	m/s	4.27 – 4.33	4.27	Pass
Upper Rib	G's	37 – 46	37	Pass
Lower Rib	G's	37 – 46	42	Pass
Lower Spine	G's	15 - 22	19	Pass
		Overall Test Results		Pass

Laboratory Technician

2/6/02
Test Date

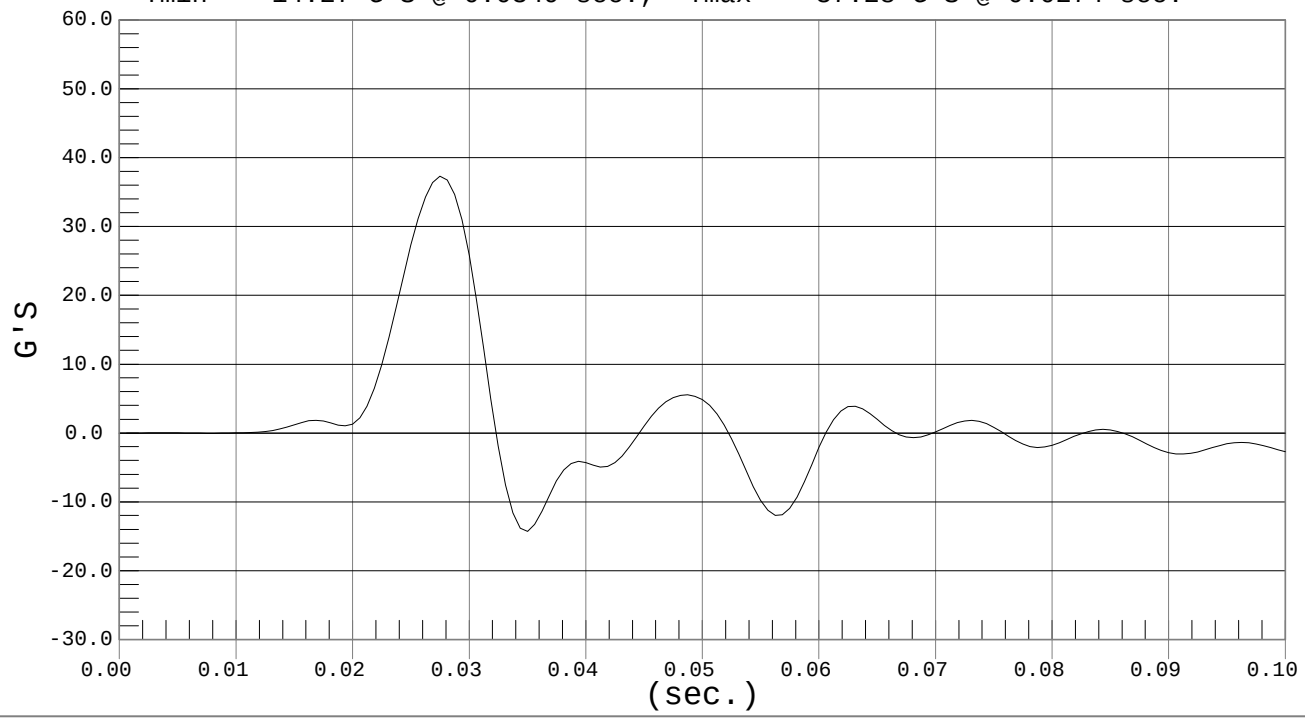
Approved By

UPPER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -14.27 G'S @ 0.0349 sec., Ymax = 37.28 G'S @ 0.0274 sec.

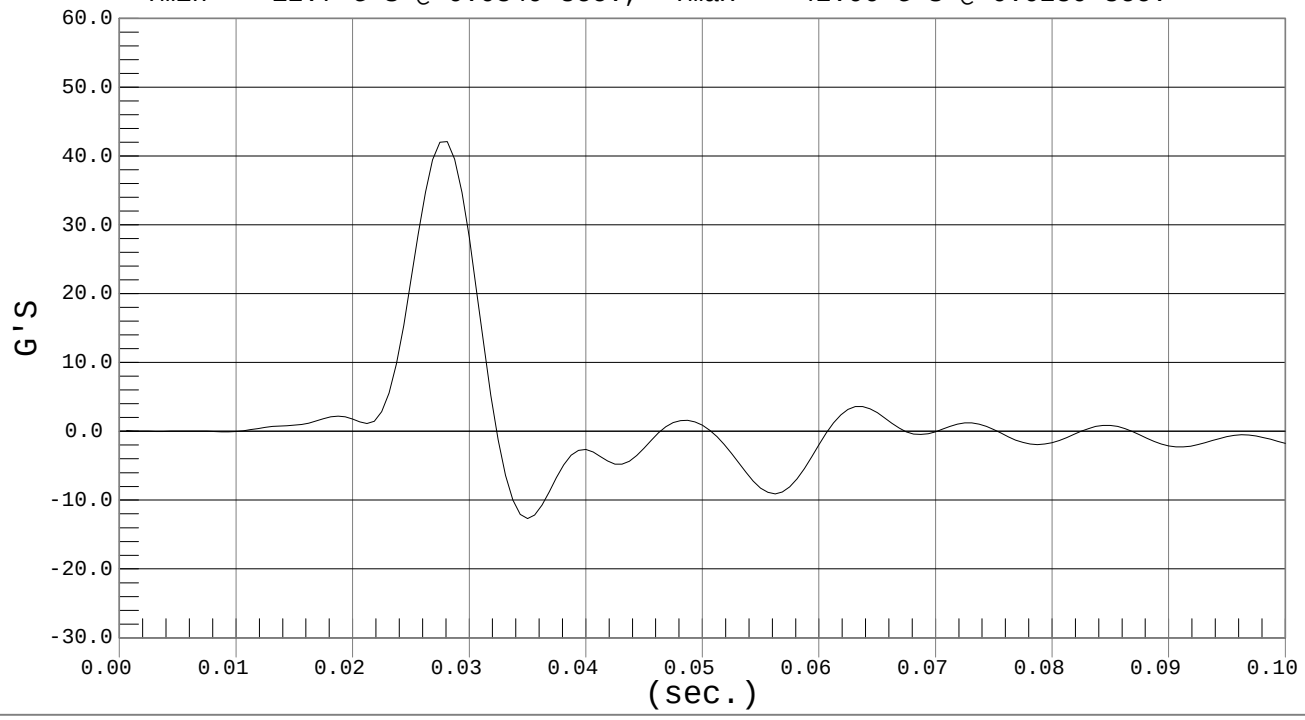


LOWER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -12.7 G'S @ 0.0349 sec., Ymax = 42.06 G'S @ 0.0280 sec.

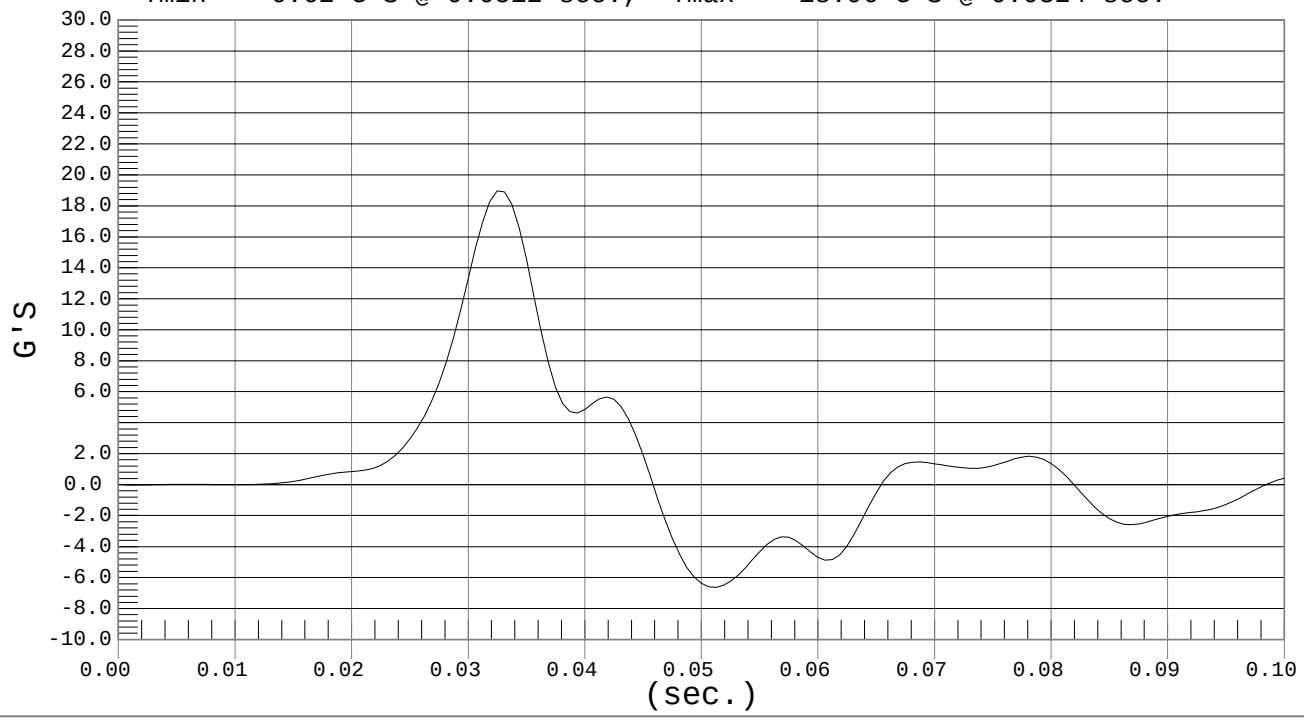


LOWER SPINE ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-06-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -6.62 G'S @ 0.0512 sec., Ymax = 18.96 G'S @ 0.0324 sec.



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Calibration

ATD Serial No.:049 Test I.D.:D02173

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
Probe Speed	m/s	4.27 – 4.33	4.28	Pass
Pelvis Acceleration	G's	40 - 60	50	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

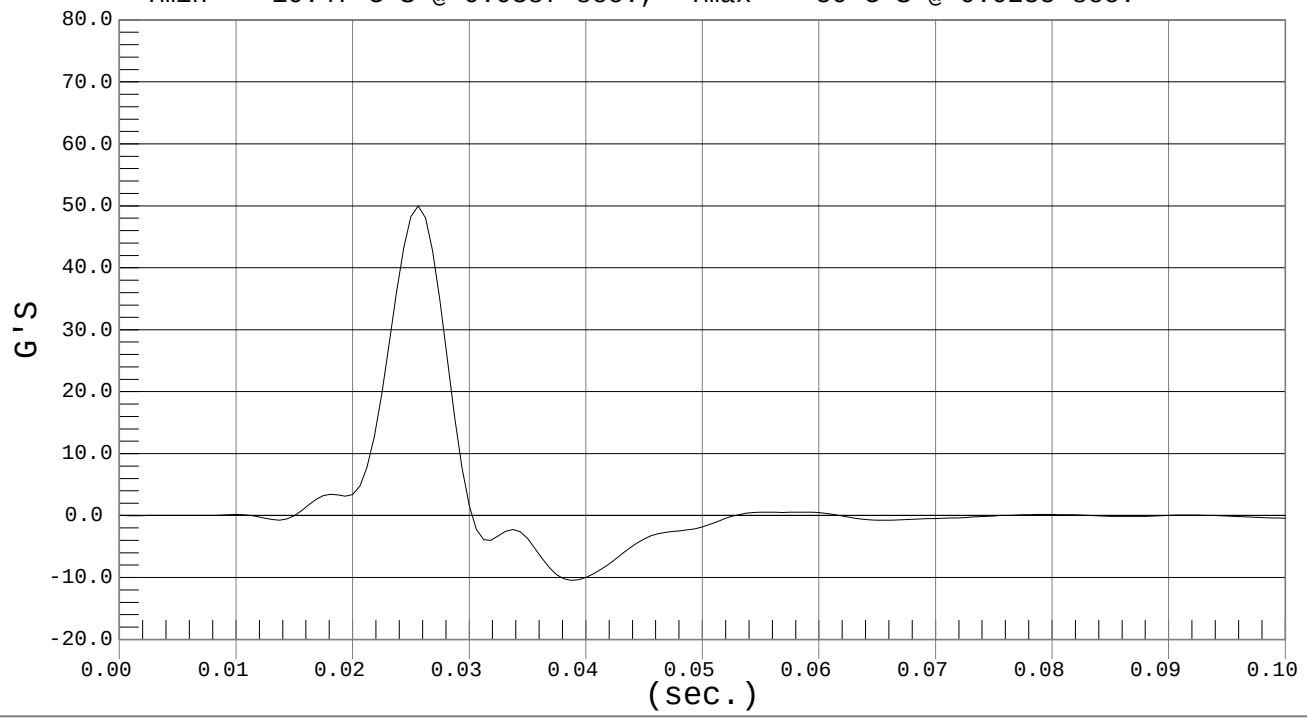
Approved By

PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #049

Test Date: 02-06-02
Speed: 14.0 fps, 4.28 M/s

Ymin = -10.47 G'S @ 0.0387 sec., Ymax = 50 G'S @ 0.0255 sec.



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Preload = 10 lbs)

ATD Serial No.:049 Test I.D.:D02174

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Force @ 12.7	mm	104 – 162	144	Pass
Force @ 19	mm	163 – 222	202	Pass
Force @ 25.4	mm	222 – 280	269	Pass
Force @ 33	mm	325 - 391	380	Pass
		Overall Test Results		Pass

Laboratory Technician

2/6/02
Test Date

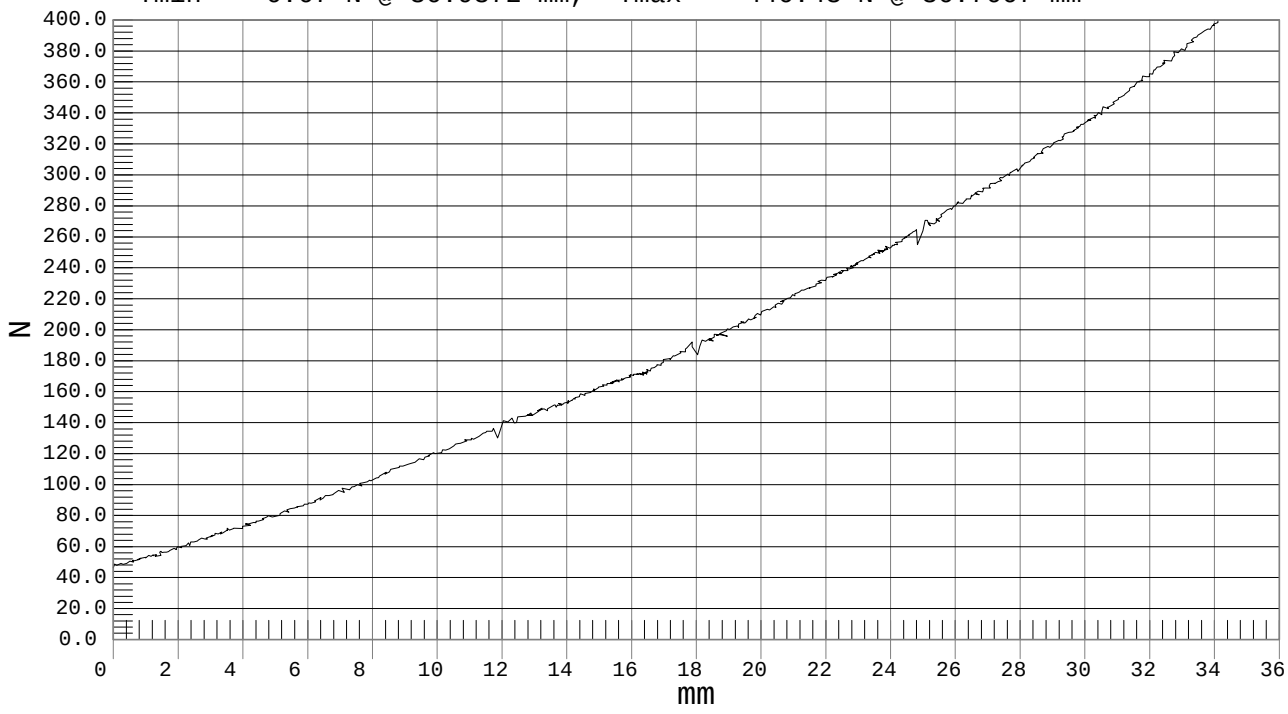
Approved By

ABDOMEN COMPRESSION

Test Desc.: ABDOMEN COMPRESSION
Component: DUMMY # 049

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -6.67 N @ 36.9372 mm, Ymax = 446.43 N @ 36.7667 mm



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No.:049 Test I.D.:D02175

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Force @ 0	mm	0 – 26.7	0	Pass
Force @ 20	mm	97.9 – 151.2	126.5	Pass
Force @ 30	mm	151.2 – 204.6	190.2	Pass
Force @ 40	mm	204.6 – 258.0	253.9	Pass
Return Angle	Degrees	12 Maximum	2	Pass
		Overall Test Results		Pass

_____ 2/6/02

Laboratory Technician Test Date

_____

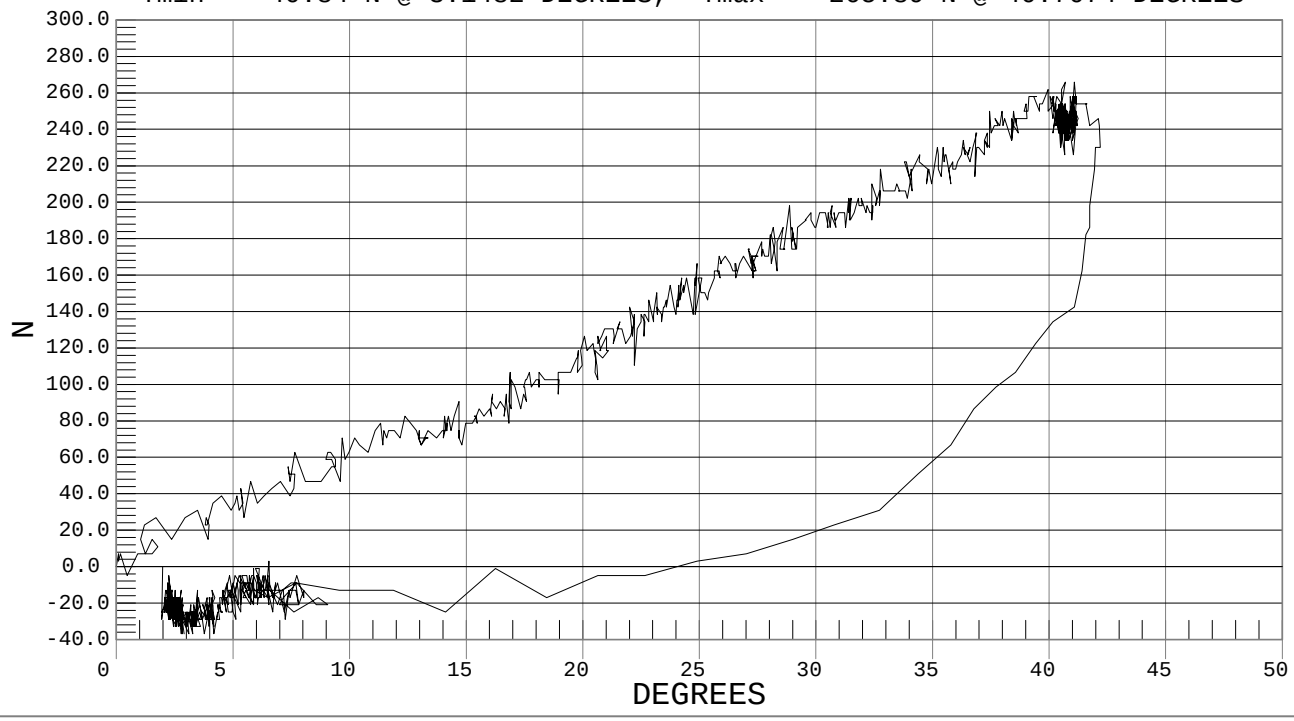
Approved By

LUMBAR FLEXION

Test Desc.: LUMBAR FLEXION
Component: DUMMY # 049

Test Date: 02-06-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -40.84 N @ 3.1482 DEGREES, Ymax = 265.89 N @ 40.7074 DEGREES



SID Calibration Data Sheet

Side Impact Dummy

Inspection Checklist

ATD Serial No.:049

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, weldment, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Pass Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Notes (include component/problem/section/reason):

_____ 2/6/02

Laboratory Technician Test Date

_____

Approved By

CERTIFICATION DATA

Dummy Serial Number:048

Calibration Test Results Summary

Dummy Serial Number: 048

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

External Measurements

ATD Serial No.:048 Test Number:D0224

Tested Parameter	Units	Specification	Result	Pass/Fail
SH – Seated Height	mm	889 - 909	902	Pass
RH – Rib Height	mm	501 – 521	507	Pass
HP – Hip Pivot Height	mm	99 ref.	99	Pass
RD-Rib from Back Line	mm	229 – 241	236	Pass
KV – Knee Pivot from Back Line	mm	511 – 526	519	Pass
SW – Knee Pivot to Floor	mm	490 – 505	492	Pass
HW – Hip Width	mm	356 – 391	364	Pass
		Overall Test Results		Pass

_____ 2/18/02

Laboratory Technician Test Date

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Approved By

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration

ATD Serial No.:048 Test I.D.:D02241

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	210 to 260	250	Pass
Peak Lateral Acceleration	G's	< 10	7	Pass
Time Above 100 G	msec	0.9 – 1.5	1.1	Pass
		Overall Test Results		Pass

_____ 2/15/02

Laboratory Technician Test Date

_____

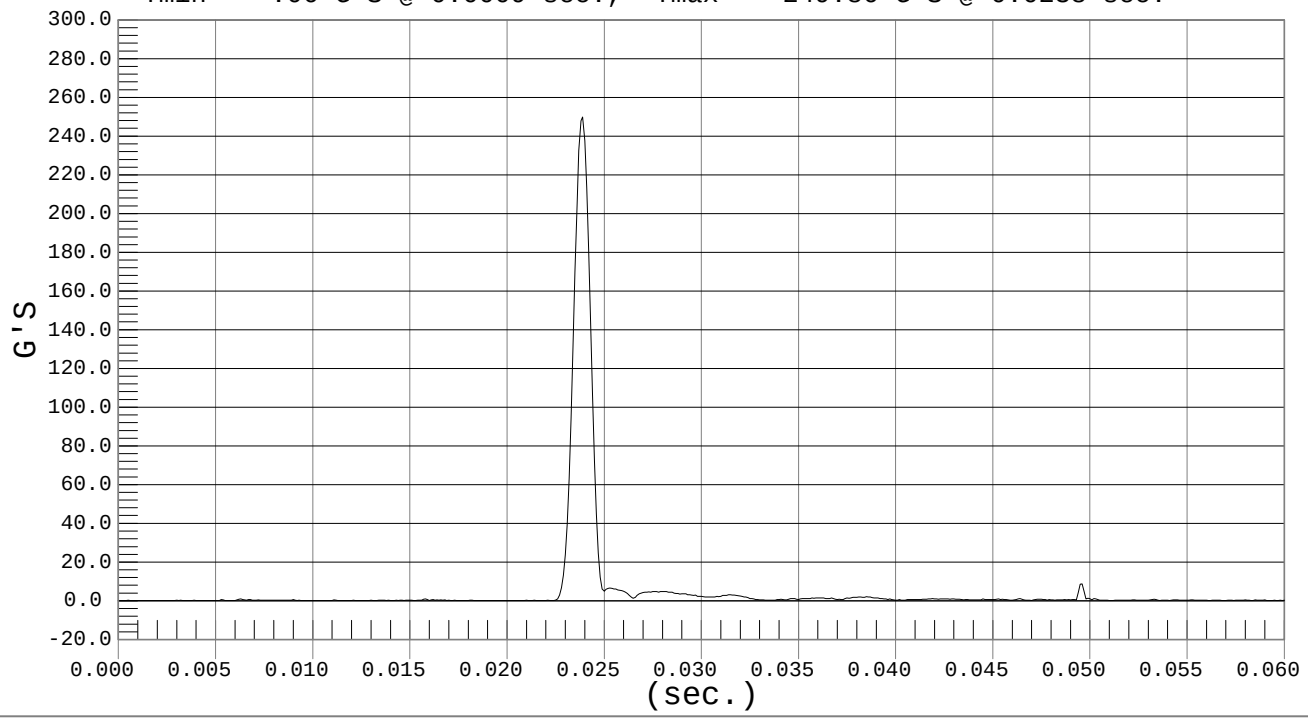
Approved By

PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #048

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = .06 G'S @ 0.0009 sec., Ymax = 249.86 G'S @ 0.0238 sec.

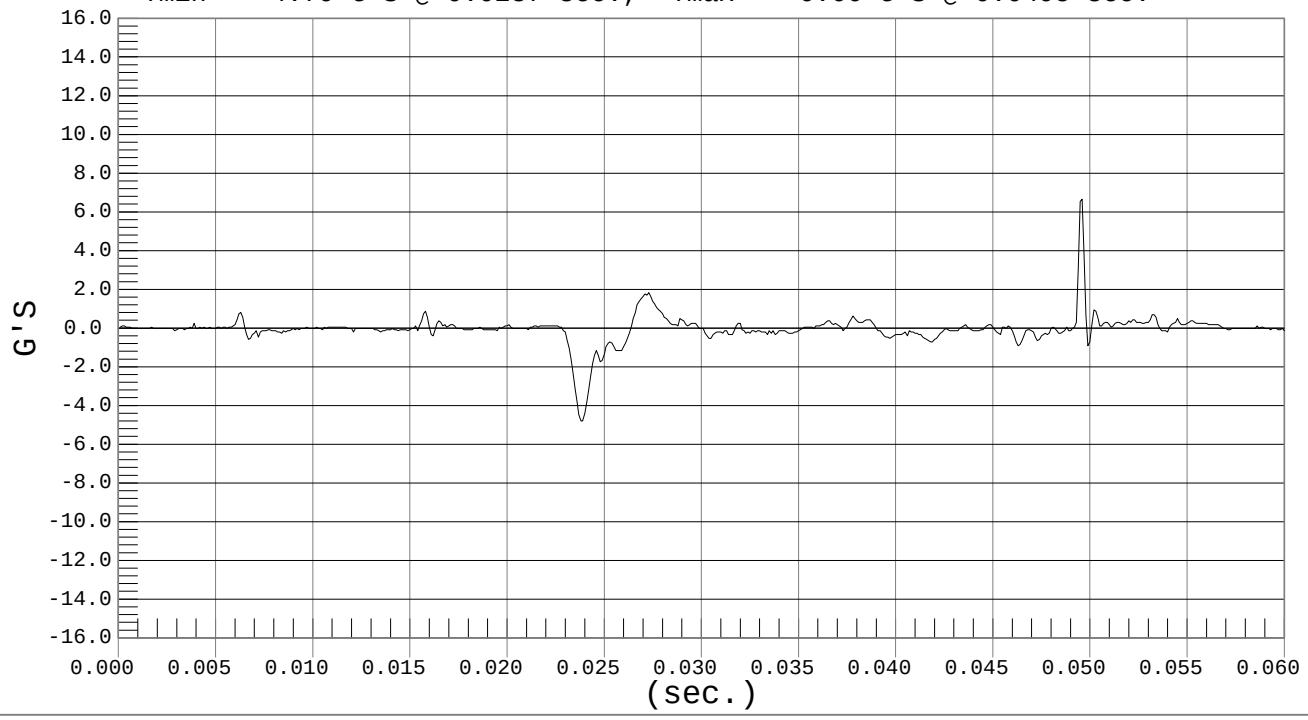


PEAK LATERAL ACCELRATION

Test Desc.: Head Drop
Component: Dummy #048

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -4.79 G'S @ 0.0237 sec., Ymax = 6.66 G'S @ 0.0495 sec.



SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Calibration

ATD Serial No.:048 Test I.D.:D02242

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	23.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/s	4.27 – 4.33	4.27	Pass
Upper Rib	G's	37 – 46	38	Pass
Lower Rib	G's	37 – 46	37	Pass
Lower Spine	G's	15 - 22	19	Pass
		Overall Test Results		Pass

2/18/02

Laboratory Technician Test Date

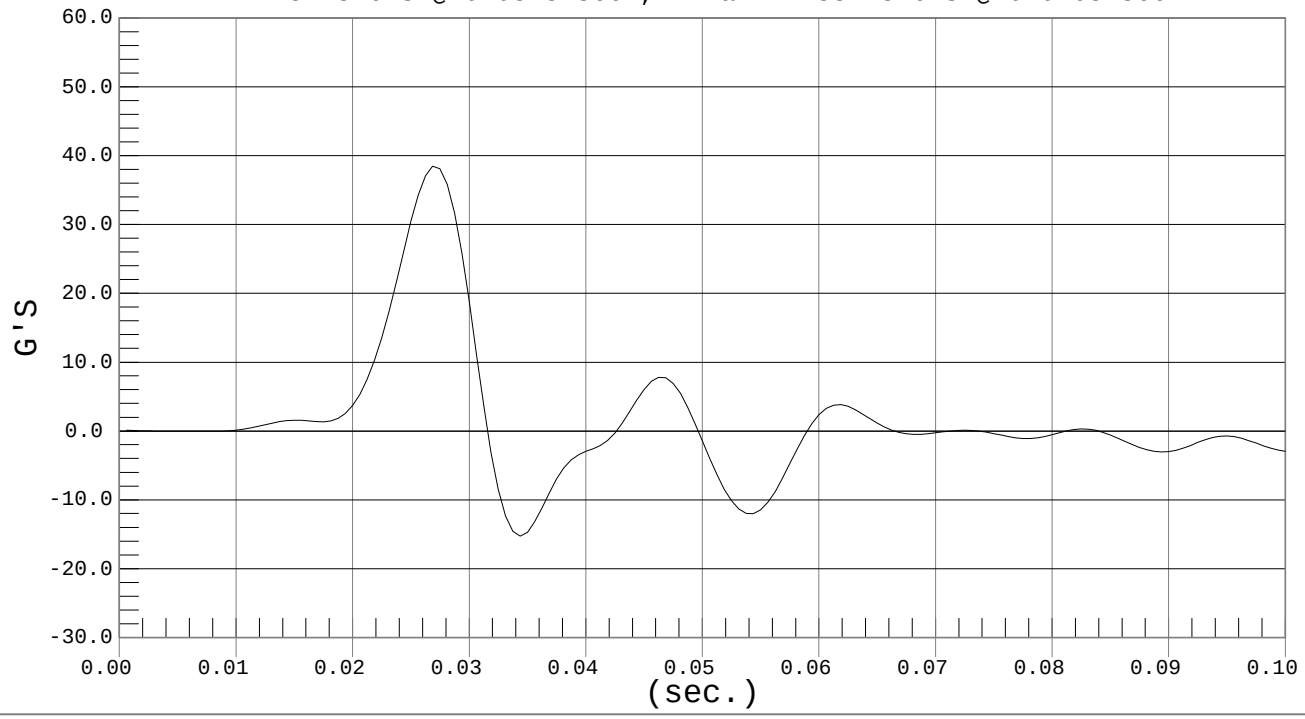
Approved By

UPPER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -15.28 G'S @ 0.0343 sec., Ymax = 38.48 G'S @ 0.0268 sec.

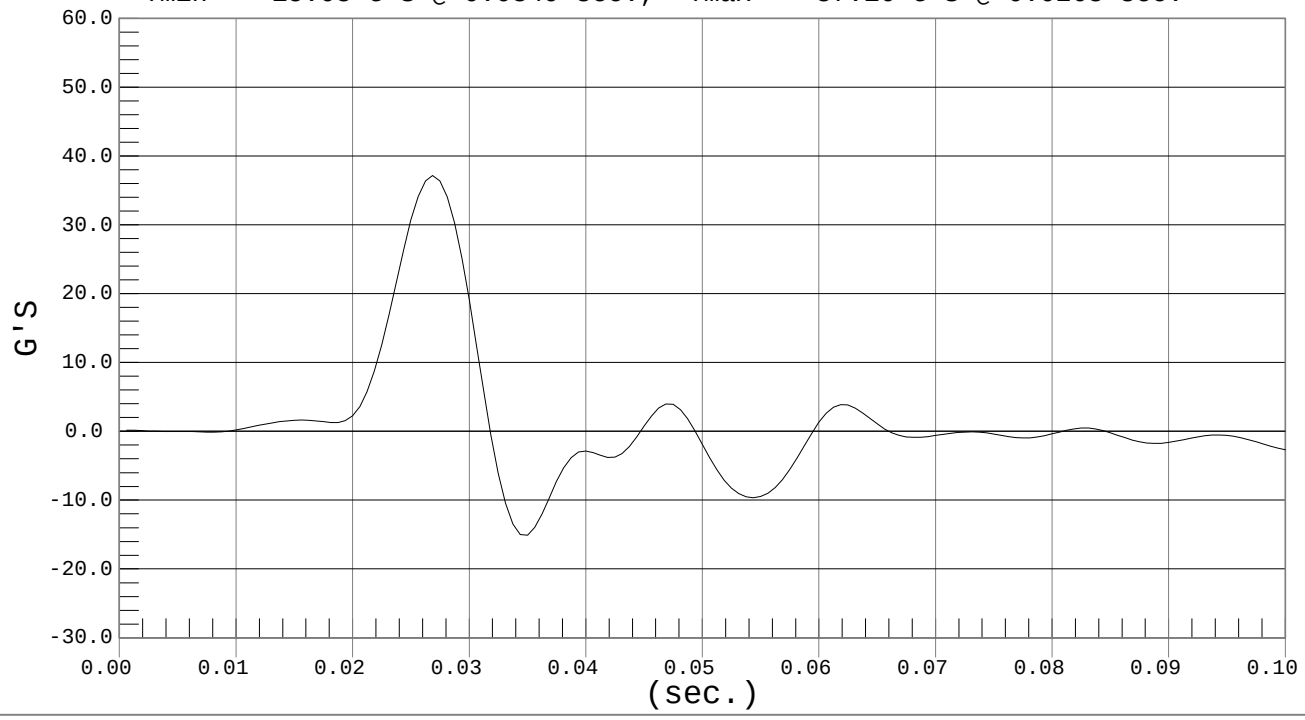


LOWER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -15.08 G'S @ 0.0349 sec., Ymax = 37.16 G'S @ 0.0268 sec.

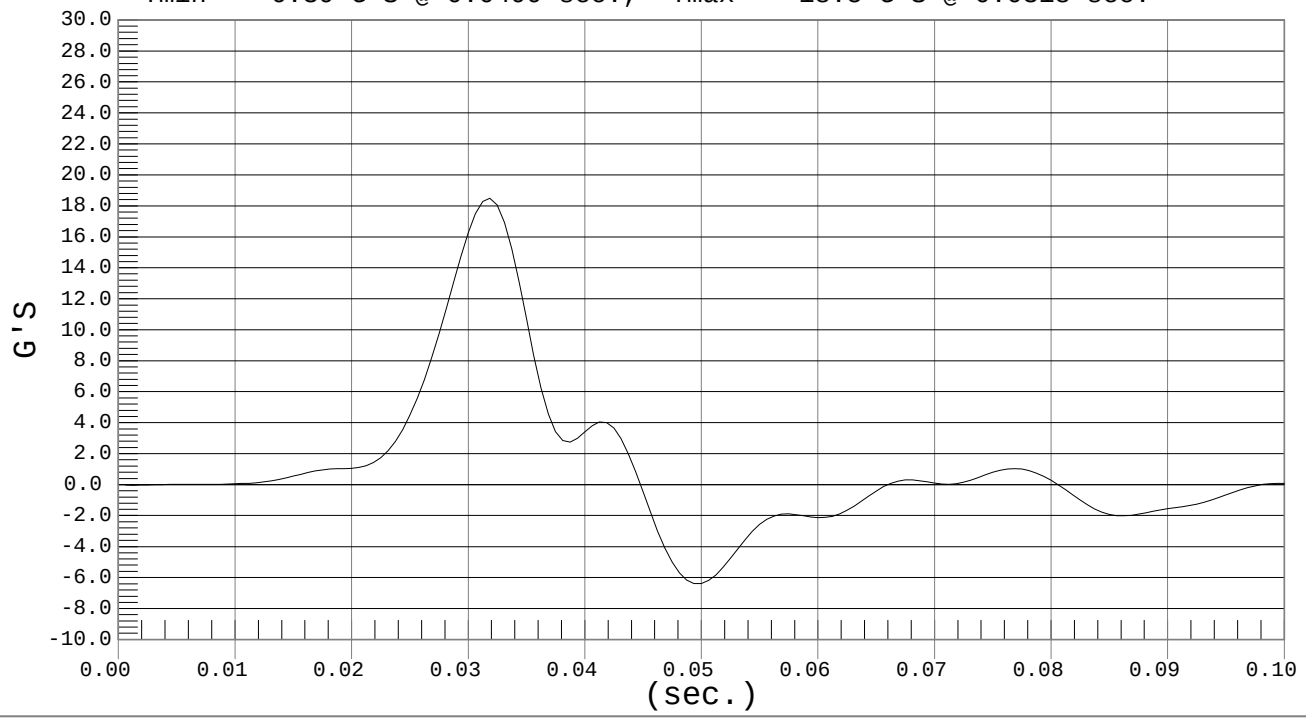


LOWER SPINE ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #048

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -6.39 G'S @ 0.0499 sec., Ymax = 18.5 G'S @ 0.0318 sec.



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Calibration

ATD Serial No.:048 Test I.D.:D022443

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	23.1	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	4.27 – 4.33	4.27	Pass
Pelvis Acceleration	G's	40 - 60	43	Pass
		Overall Test Results		Pass

_____ 2/18/02

Laboratory Technician Test Date

_____

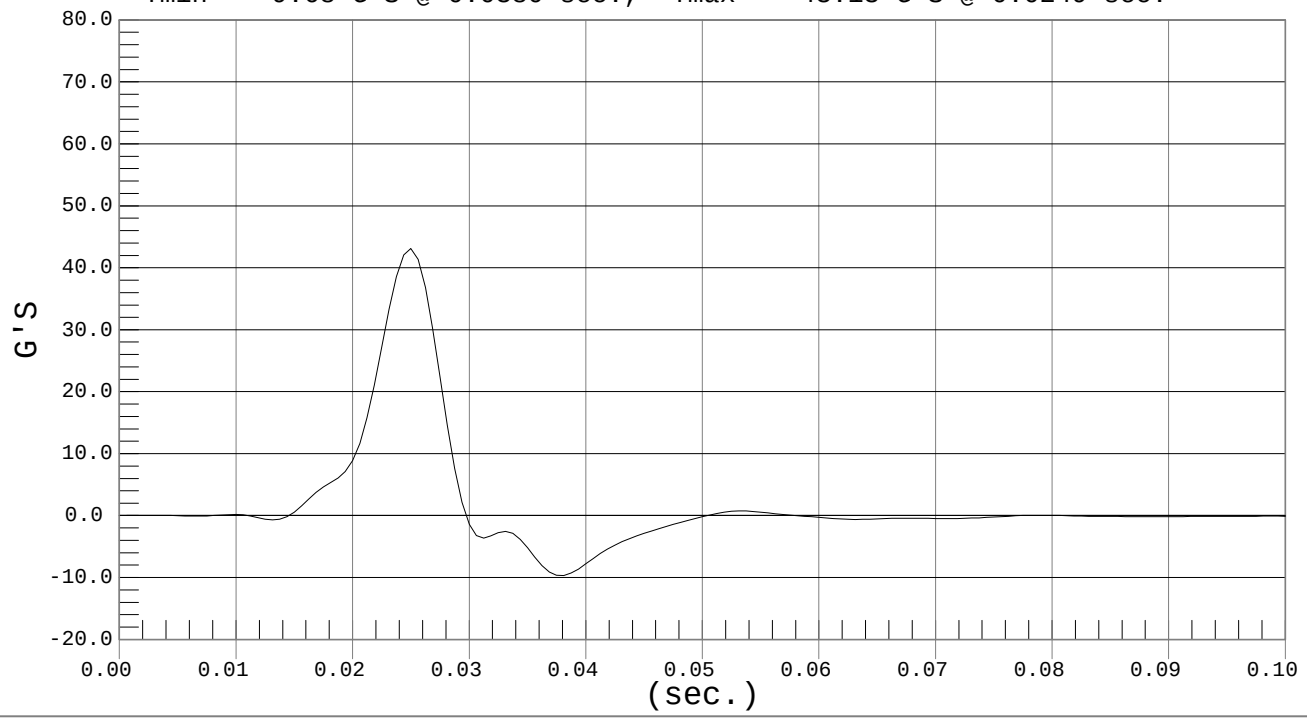
Approved By

PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #048

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -9.68 G'S @ 0.0380 sec., Ymax = 43.13 G'S @ 0.0249 sec.



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Preload = 10 lbs)

ATD Serial No.:048 Test I.D.:D02244

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force @ 12.7	mm	104 – 162	141	Pass
Force @ 19	mm	163 – 222	195	Pass
Force @ 25.4	mm	222 – 280	263	Pass
Force @ 33	mm	325 - 391	366	Pass
		Overall Test Results		Pass

2/15/02

Laboratory Technician Test Date

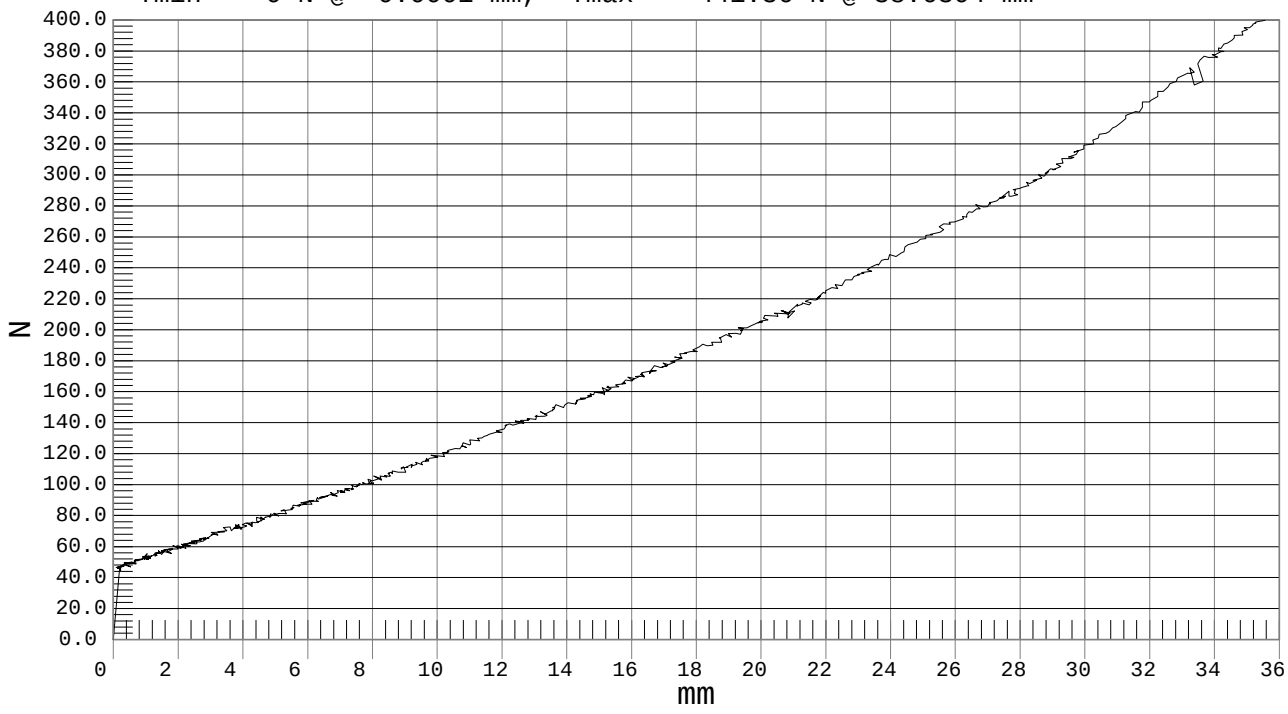
Approved By

ABDOMEN COMPRESSION

Test Desc.: ABDOMEN COMPRESSION
Component: DUMMY # 048

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = 0 N @ -0.0001 mm, Ymax = 441.36 N @ 38.6304 mm



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No.:048 Test I.D.:D02245

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force @ 0	mm	0 – 26.7	0	Pass
Force @ 20	mm	97.9 – 151.2	118.9	Pass
Force @ 30	mm	151.2 – 204.6	172.0	Pass
Force @ 40	mm	204.6 – 258.0	225.1	Pass
Return Angle	Degrees	12 Maximum	9	Pass
		Overall Test Results		Pass

Laboratory Technician

2/15/02
Test Date

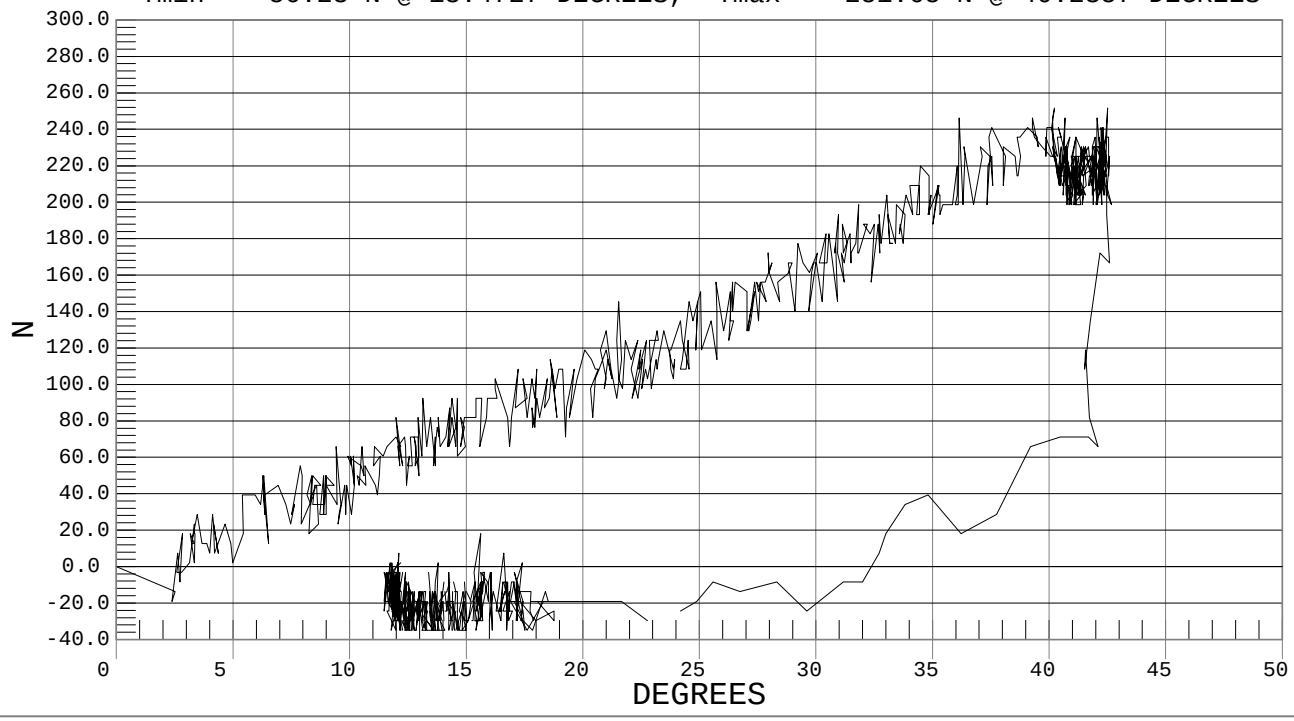
Approved By

LUMBAR FLEXION

Test Desc.: LUMBAR FLEXION
Component: DUMMY # 048

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -56.23 N @ 13.4727 DEGREES, Ymax = 251.65 N @ 40.2357 DEGREES



SID Calibration Data Sheet

Side Impact Dummy

Inspection Checklist

ATD Serial No.:048

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, weldment, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Pass Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Notes (include component/problem/section/reason):

_____ 2/18/02

Laboratory Technician Test Date

_____

Approved By

CERTIFICATION DATA

Dummy Serial Number: 049

Calibration Test Results Summary

Dummy Serial Number: 049

Post-Test Calibration

External Dimensions:	The dummy passed all external dimension requirements.
Head Drop Test:	The head passed all drop test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

External Measurements

ATD Serial No.:049 Test Number:D0225

Tested Parameter	Units	Specification	Result	Pass/Fail
SH – Seated Height	mm	889 - 909	898	Pass
RH – Rib Height	mm	501 – 521	517	Pass
HP – Hip Pivot Height	mm	99 ref.	99	Pass
RD-Rib from Back Line	mm	229 – 241	232	Pass
KV – Knee Pivot from Back Line	mm	511 – 526	522	Pass
SW – Knee Pivot to Floor	mm	490 – 505	492	Pass
HW – Hip Width	mm	356 – 391	367	Pass
		Overall Test Results		Pass

2/18/02

Laboratory Technician Test Date

Approved By

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration

ATD Serial No.:049 Test I.D.:D02251

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	21	Pass
Peak Resultant Acceleration	G's	210 to 260	229	Pass
Peak Lateral Acceleration	G's	< 10	-2	Pass
Time Above 100 G	msec	0.9 – 1.5	1.2	Pass
		Overall Test Results		Pass

_____ 2/15/02

Laboratory Technician Test Date

_____

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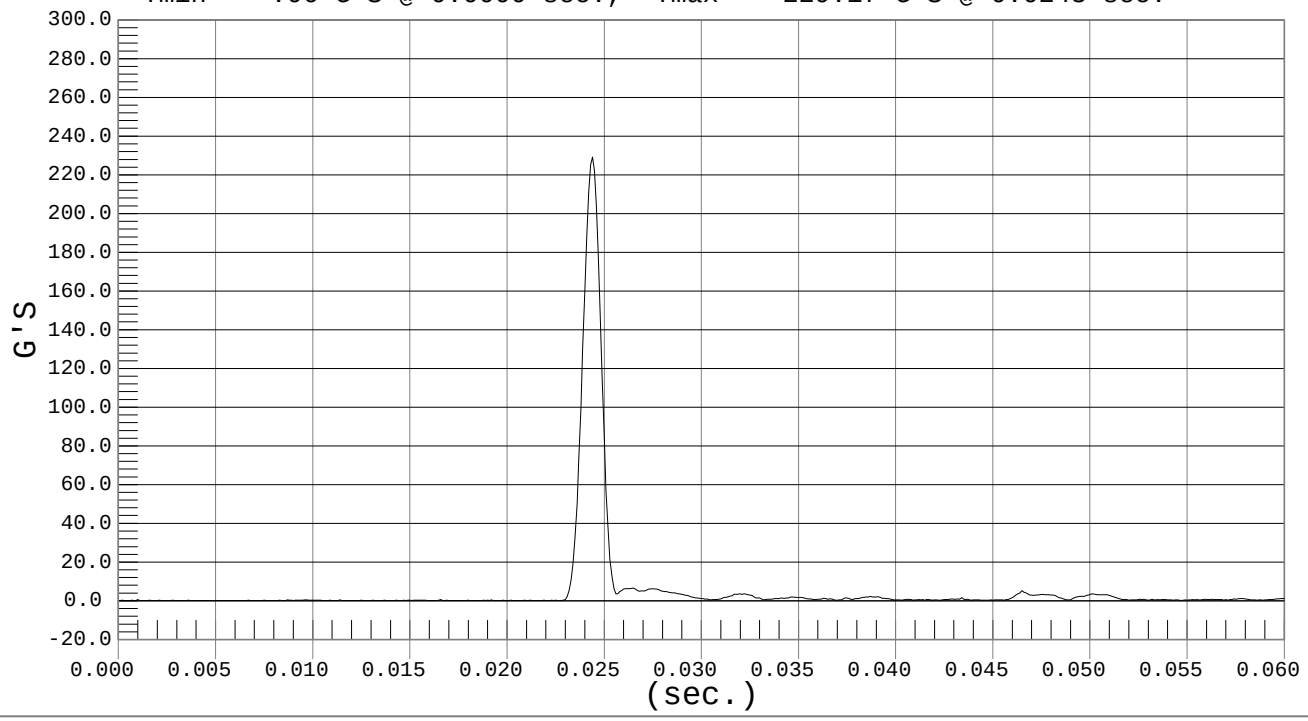
PEAK RESULTANT ACCELERATION

Test Desc.: Head Drop
Component: Dummy #049

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = .06 G'S @ 0.0000 sec., Ymax = 229.17 G'S @ 0.0243 sec.

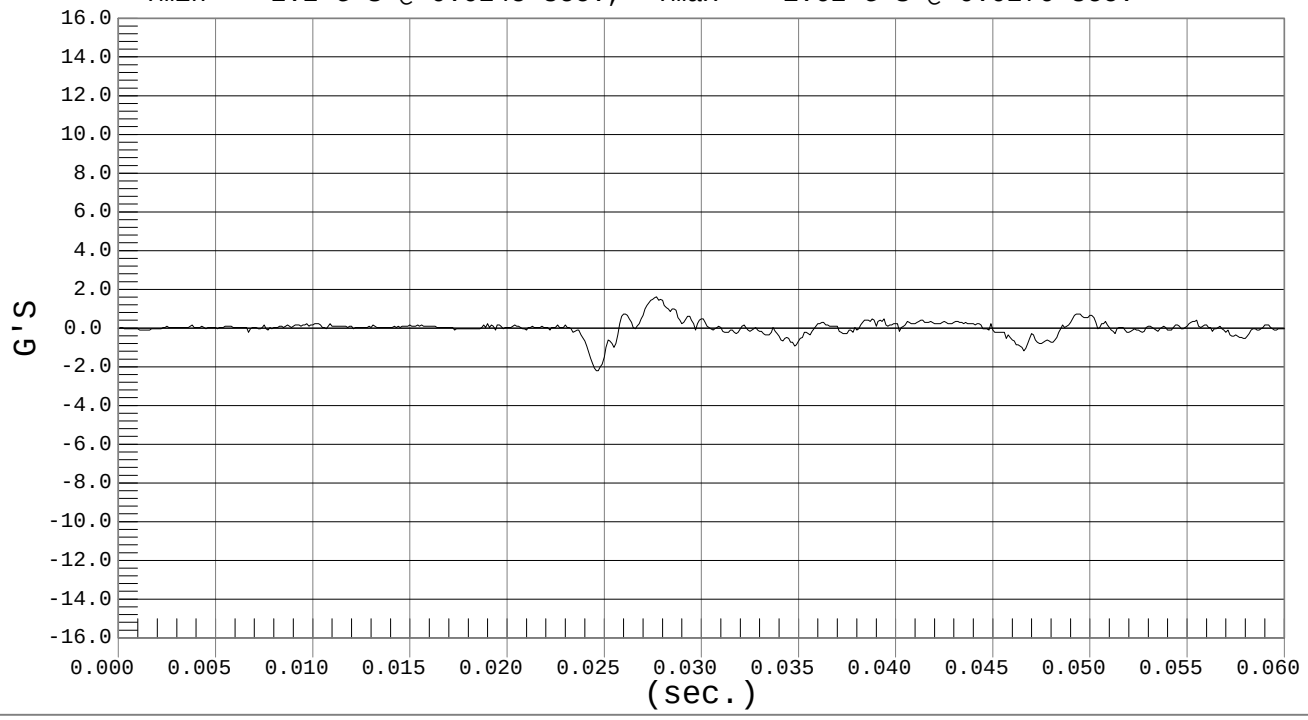


PEAK LATERAL ACCELRATION

Test Desc.: Head Drop
Component: Dummy #049

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -2.2 G'S @ 0.0245 sec., Ymax = 1.62 G'S @ 0.0276 sec.



SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Calibration

ATD Serial No.:049 Test I.D.:D02252

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	23.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Velocity	m/s	4.27 – 4.33	4.27	Pass
Upper Rib	G's	37 – 46	41	Pass
Lower Rib	G's	37 – 46	40	Pass
Lower Spine	G's	15 - 22	19	Pass
		Overall Test Results		Pass

2/18/02

Laboratory Technician Test Date

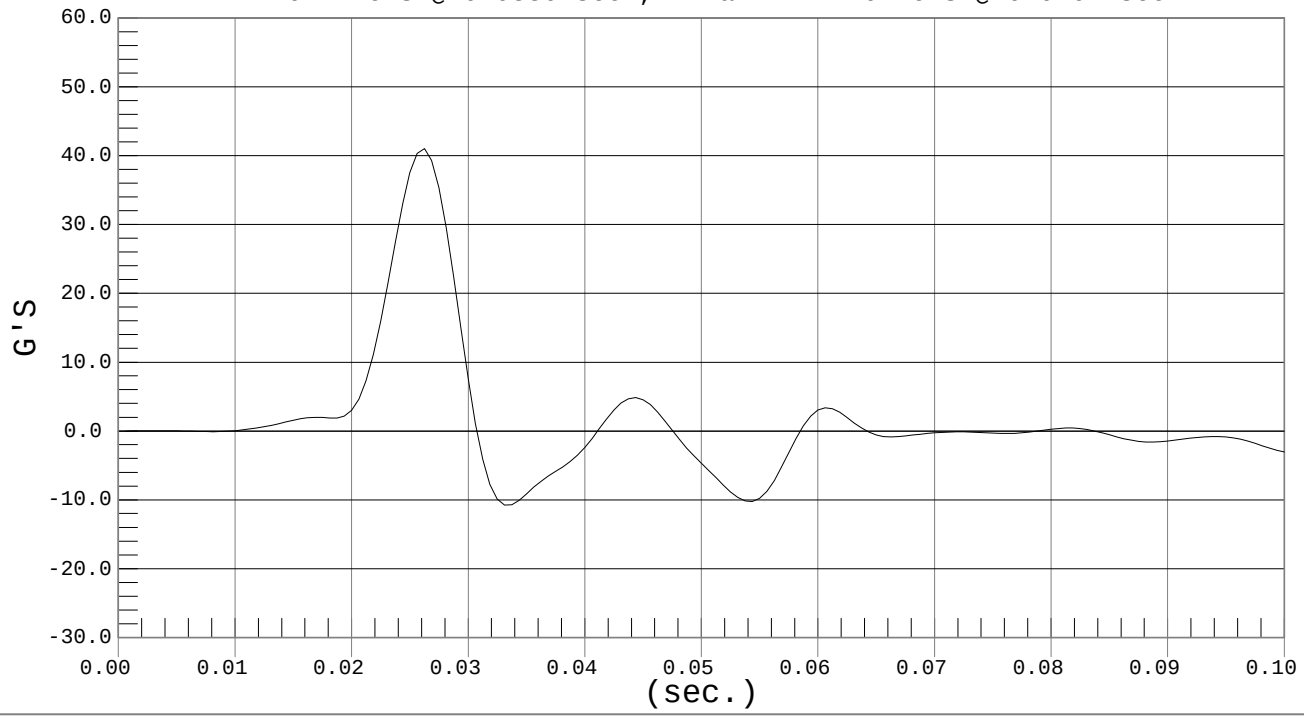
Approved By

UPPER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -10.77 G'S @ 0.0330 sec., Ymax = 41.02 G'S @ 0.0262 sec.

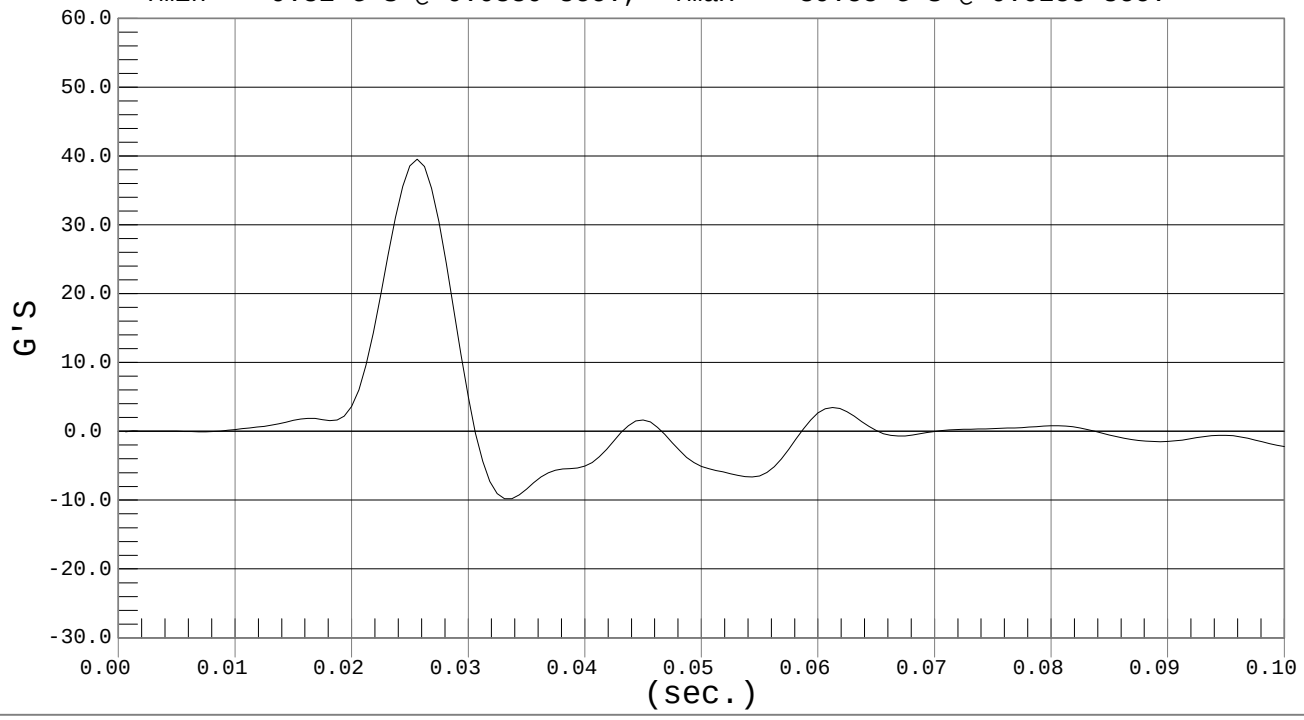


LOWER RIB ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -9.81 G'S @ 0.0330 sec., Ymax = 39.55 G'S @ 0.0255 sec.

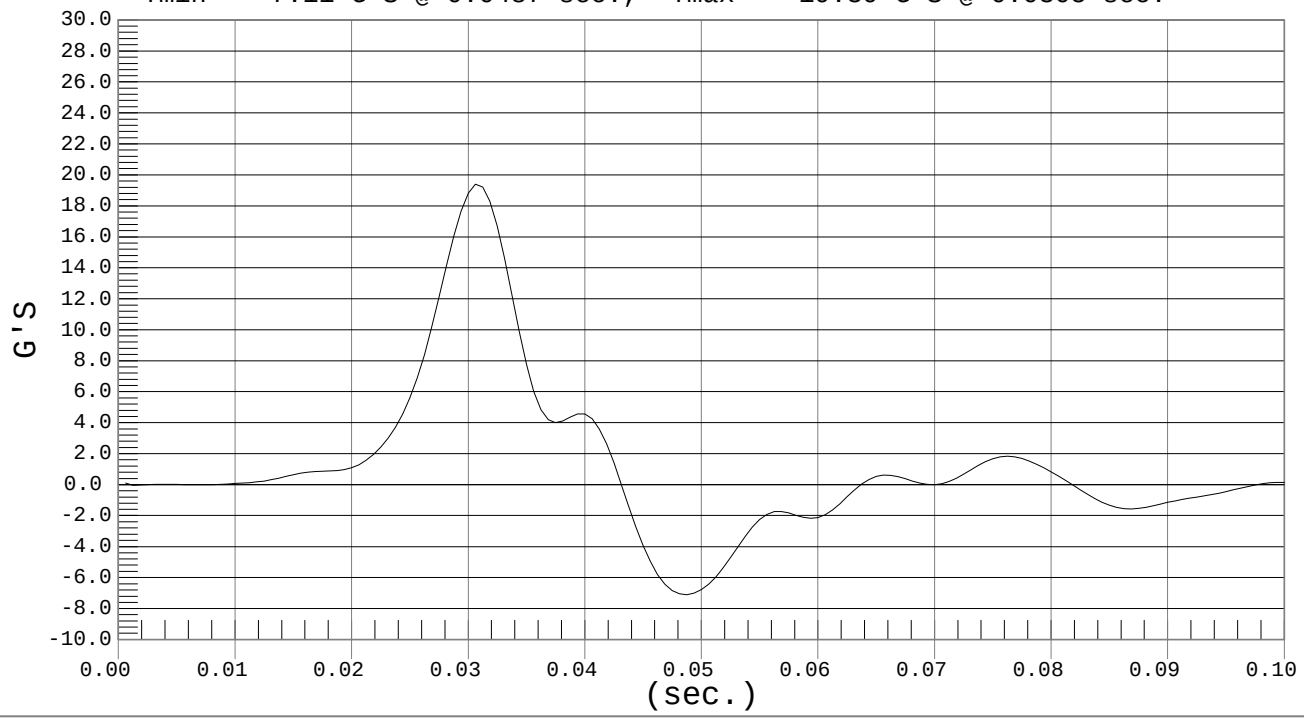


LOWER SPINE ACCELERATION

Test Desc.: Thorax Impact
Component: Dummy #049

Test Date: 02-18-02
Speed: 14.0 fps, 4.27 M/s

Ymin = -7.11 G'S @ 0.0487 sec., Ymax = 19.39 G'S @ 0.0305 sec.



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Calibration

ATD Serial No.:049 Test I.D.:D02253

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	23.2	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	4.27 – 4.33	4.28	Pass
Pelvis Acceleration	G's	40 - 60	49	Pass
		Overall Test Results		Pass

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Laboratory Technician Test Date

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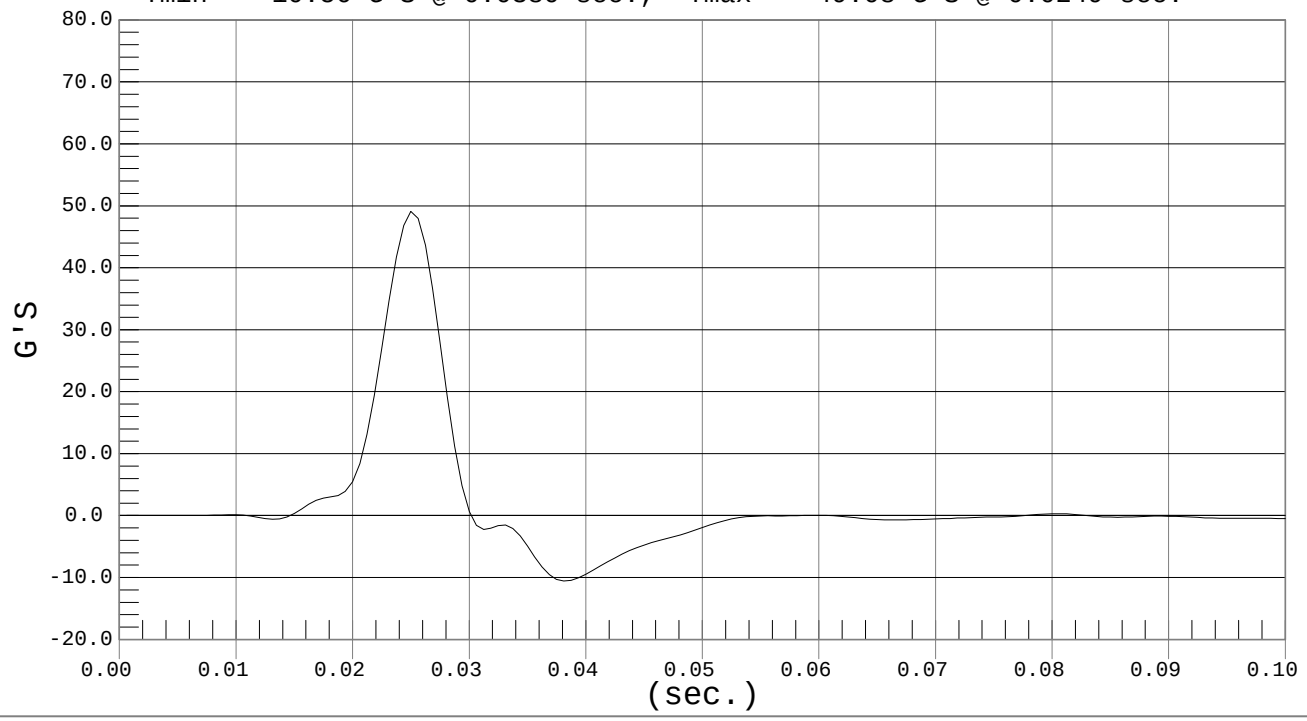
Approved By

PELVIS ACCELERATION

Test Desc.: Pelvis Impact
Component: Dummy #049

Test Date: 02-18-02
Speed: 14.0 fps, 4.28 M/s

Ymin = -10.56 G'S @ 0.0380 sec., Ymax = 49.08 G'S @ 0.0249 sec.



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Preload = 10 lbs)

ATD Serial No.:049 Test I.D.:D02254

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force @ 12.7	mm	104 – 162	135	Pass
Force @ 19	mm	163 – 222	186	Pass
Force @ 25.4	mm	222 – 280	248	Pass
Force @ 33	mm	325 - 391	339	Pass
		Overall Test Results		Pass

2/15/02

Laboratory Technician Test Date

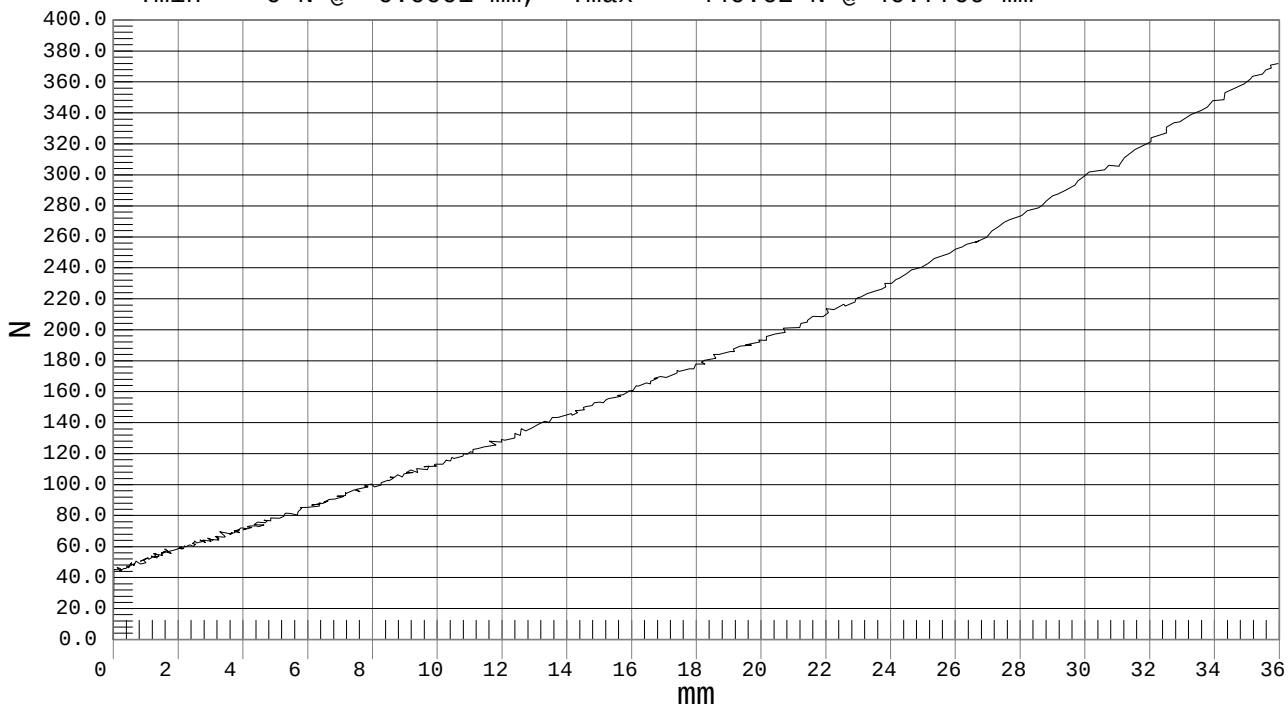
Approved By

ABDOMEN COMPRESSION

Test Desc.: ABDOMEN COMPRESSION
Component: DUMMY # 049

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = 0 N @ -0.0001 mm, Ymax = 440.62 N @ 40.7709 mm



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No.:049 Test I.D.:D02255

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	18.9 – 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Force @ 0	mm	0 – 26.7	0	Pass
Force @ 20	mm	97.9 – 151.2	99.2	Pass
Force @ 30	mm	151.2 – 204.6	155.5	Pass
Force @ 40	mm	204.6 – 258.0	215.8	Pass
Return Angle	Degrees	12 Maximum	8	Pass
		Overall Test Results		Pass

2/15/02

Laboratory Technician Test Date

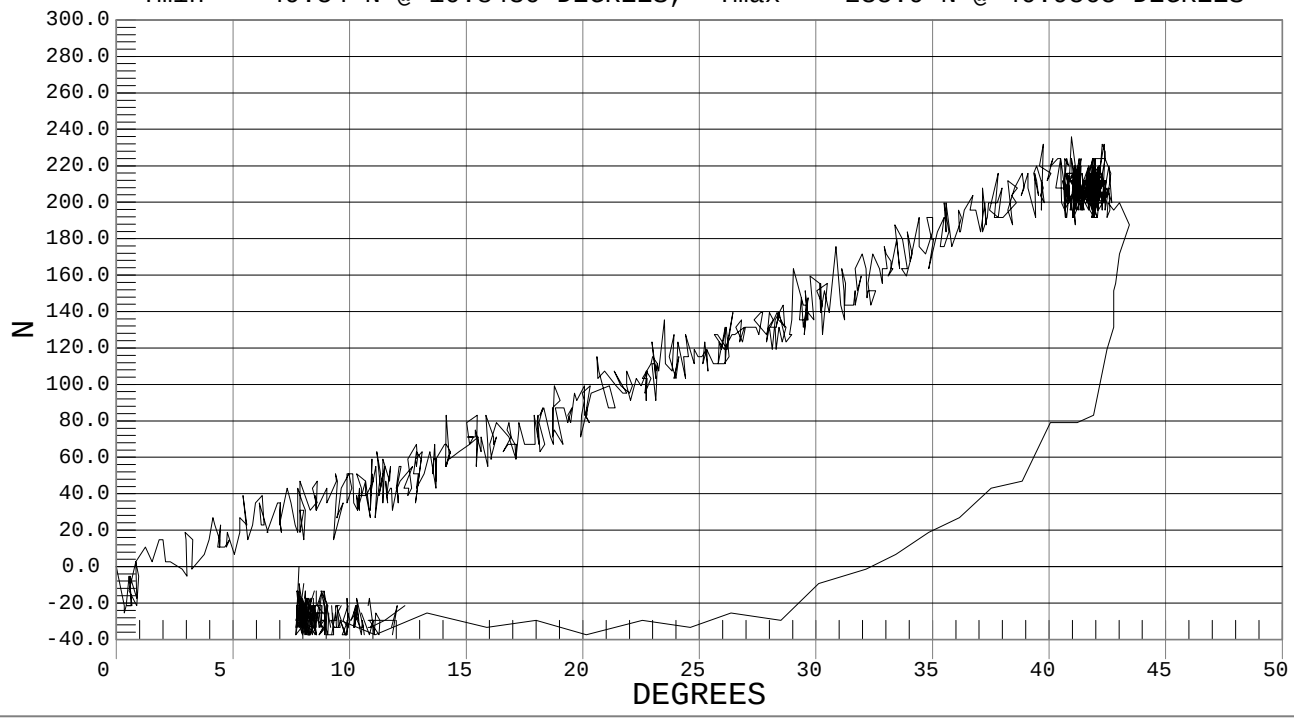
Approved By

LUMBAR FLEXION

Test Desc.: LUMBAR FLEXION
Component: DUMMY # 049

Test Date: 02-15-02
Speed: 0.0 fps, 0.00 M/s

Ymin = -49.54 N @ 10.8430 DEGREES, Ymax = 235.9 N @ 40.9565 DEGREES



SID Calibration Data Sheet

Side Impact Dummy

Inspection Checklist

ATD Serial No.:049

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, weldment, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Pass Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Notes (include component/problem/section/reason):

_____ 2/18/02

Laboratory Technician Test Date

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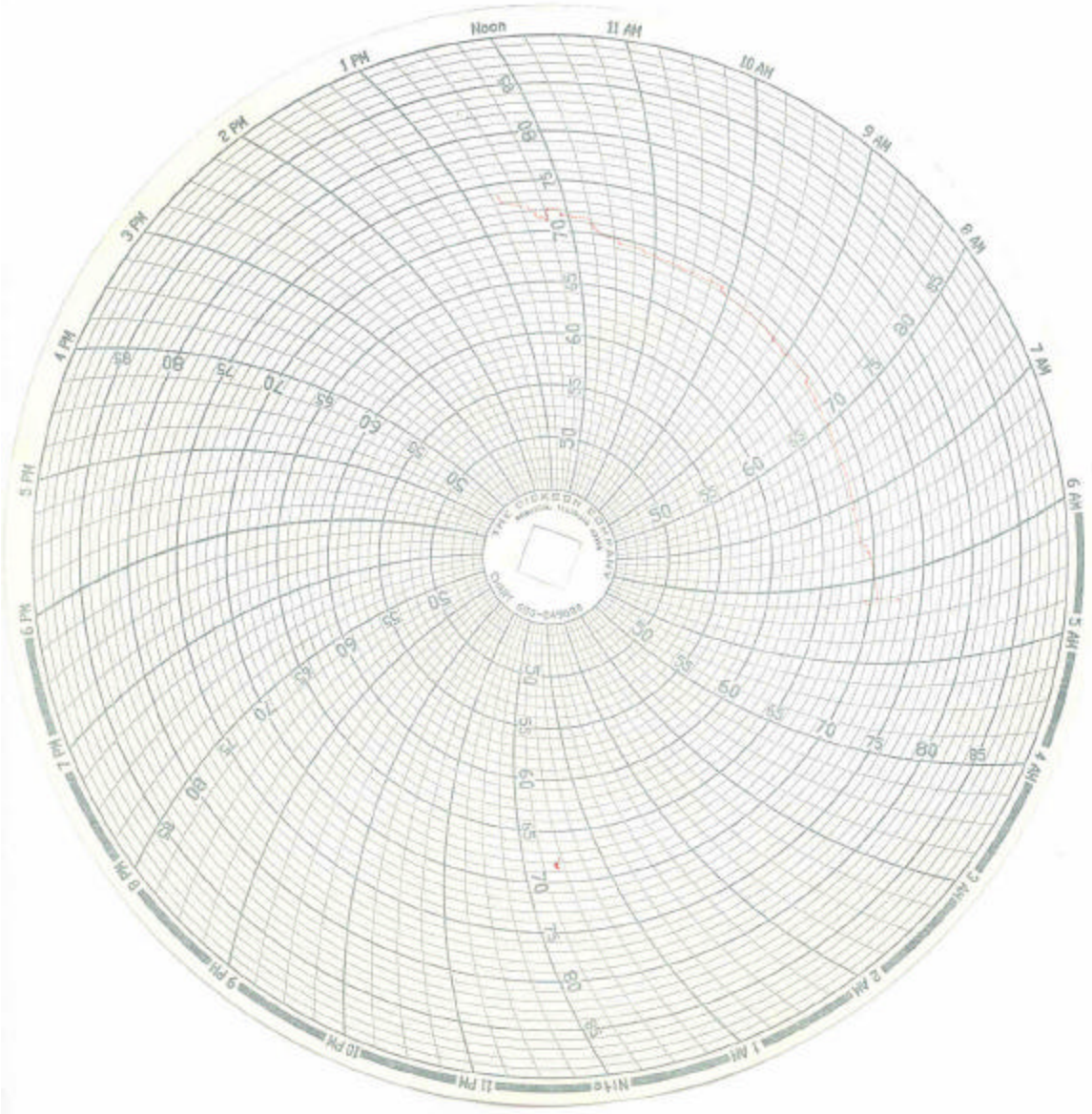
Vehicle and Dummy Temperature



APPENDIX D

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

DUMMY AND VEHICLE CALIBRATION DATA

	INSTRUMENTS FOR PASSENGER DUMMY NO. 48		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	J23808	Endevco	1/7/02
Lower Rib Y	AHWP2	Endevco	1/8/02
Lower Spine Y	AN8D2	Endevco	1/8/02
Pelvis Y	ALFP5	Endevco	1/7/02
Upper Rib Redundant Y	AKAF3	Endevco	1/7/02
Lower Rib Redundant Y	AHY98	Endevco	1/8/02
Lower Spine Redundant Y	J13709	Endevco	1/8/02
Pelvis Redundant Y	AK956	Endevco	1/7/02
Head Center of Gravity X	J11630	Endevco	1/8/02
Head Center of Gravity Y	J12423	Endevco	1/7/02
Head Center of Gravity Z	J11046	Endevco	1/8/02

	INSTRUMENTS FOR DRIVER DUMMY NO. 49		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Rib Y	AGTM8	Endevco	1/8/02
Lower Rib Y	AN8D5	Endevco	1/8/02
Lower Spine Y	AK972	Endevco	1/7/02
Pelvis Y	AGRW3	Endevco	1/8/02
Upper Rib Redundant Y	AJ411	Endevco	1/8/02
Lower Rib Redundant Y	AGP28	Endevco	1/8/02
Lower Spine Redundant Y	AHY71	Endevco	1/8/02
Pelvis Redundant Y	AMPYO	Endevco	1/8/02
Head Center of Gravity X	AHRP6	Endevco	1/8/02
Head Center of Gravity Y	AP170	Endevco	1/8/02
Head Center of Gravity Z	AP9G2	Endevco	1/8/02

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Mid A-Post Y	G13-F10	Entran	1/16/02
Left Lower A-Post Y	E10-F20	Entran	11/2/01
Left Lower B-Post Y	I18-E14	Entran	11/2/01
Rear Floorpan Above Axle X	I12-F01	Entran	10/10/01
Rear Floorpan Above Axle Y	G03-N06	Entran	8/7/01
Rear Floorpan Above Axle Z	I25-F01	Entran	6/19/01
Driver Seat Track Y	K21-N21	Entran	1/17/02
Right Side Sill at Front Seat X	G03-N09	Entran	1/14/02
Right Side Sill at Front Seat Y	F04-N10	Entran	1/14/02
Right Side Sill at Front Seat Z	I25-F12	Entran	1/14/02
Right Side Sill at Rear Seat X	G13-F16	Entran	7/16/01
Right Side Sill at Rear Seat Y	G13-F18	Entran	10/29/01
Right Side Sill at Rear Seat Z	G13-F03	Entran	10/29/01
Left Side Sill at Front Seat Y	G03-N08	Entran	9/27/01
Left Side Sill at Rear Seat Y	C25-A25	Entran	8/21/01
Right Rear Occupant Compartment Y	J10-E036	Entran	1/15/02
Vehicle CG X	K21-N14	Entran	12/11/01
Vehicle CG Y	K21-N17	Entran	12/17/01
Vehicle CG Z	K21-N14	Entran	12/17/01

Note: All Endevco accelerometers are Model No. 7264-2000
All Entran accelerometers are Model No. EGE-72